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THE UNIVERSITY OF ALBERTA

A CROSS-CULTURAL STUDY OF MEMORY AND REASONING

by

ⓒ PATRICK BICKERSTETH

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
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ABSTRACT

Cross-cultural research has evolved through many stages and its status and scope have been frequently examined and defined. Its current status as an independent scientific discipline notwithstanding, cross-cultural psychology still shows weaknesses in many areas. In the present study, the scope of cross-cultural psychology, characteristics of the tests used in this field, characteristics of researchers, the dependent and independent variables in previous studies, and characteristics of research designs and procedures were discussed in the light of the threats they pose for methodological vaildity.

This study involved 105 and 102 boys, from Sierra Leone and Canada, respectively, who were assigned to high and low IQ groups.

The purpose of the study was to observe the main effects of culture and IQ in the performance of certain tests of memory and reasoning.

The three main categories of tests included modality-mediated tasks, categorization tasks, and syllogisms. Figure copying and serial recall tasks were included to serve as 'marker' tests for successive and simultaneous processing.

The results indicated significant differences between the high and low IQ groups, regardless of culture, in all the tests. The Sierra Leoneans as a group out-performed the Canadians in the major areas of the syllogistic tests, whereas the Canadians out-performed the Sierra Leoneans in the major areas of the Categorization test. Subjects were required to justify their responses in syllogisms and categorization. There were no cultural differences in the broad areas of the Modality tests, though subtests showed considerable variability in respect of cultural performance.

The findings of this study were discussed in the light of previous research and suggestions were made for future research. Some other key issues were discussed. These included the important role of indigenous researchers and collaborative research in cross-cultural psychology and the use of tests to measure general intelligence cross-culturally.

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CHAPTER I

INTRODUCTION

The problem of identifying and denoting dimensions of psychological functioning is not new to the Western world. However it is not an easy problem. The problem becomes several times more difficult in non-western societies which have had to live off the intellectual and other resources of the Western world for a number of centuries. This has meant in many cases that conclusions of research have been extended to these areas, and investigations in these non-western societies have been guided by theories and beliefs which reflect the fruits of research in non-indigenous settings. Since research and other academic pursuits are expected to identify and denote dimensions of human functioning which best serve the growth and stability of society, efforts towards the understanding and realiza--tion of the full functional potential of members of various societies have become largely territorialized. Cultural differences have, therefore, been expected to produce relatively marked deviations in performance when attempts are made to de-territorialize certain of the research perspectives and outcomes of particular societies. The problems here are many. For example, language differences especially linguistic non-parallels, social meanings, and patterns of interpersonal relationships are areas where cultural differences would definitely affect the application of non-indigenous thinking. Studies are cited and discussions are presented which strongly suggest the inadvisability of making cross-cultural generalizations not only of conclusions but also of the theoretical basis preceding the conclusions of cross-cultural research. The view which has been taken is that comparisons which are made across cultures would be meaningless unless there is conceptual as well as functional equivalence between the cultures being compared.

For example, tests which do not have the same meaning in other cultures would be impossible to interprete when applied in non-indigenous settings. Test validity is one aspect of this issue. It is suggested in one case, used as illustration, that the tests applied in Sierra Leone by Dawson (1967) to measure field dependence were inappropriate.

As the review of literature also indicates, cross-cultural researchers sometimes (if not often) approach non-western groups with preset and inaccurate knowledge of their capabilities, beliefs, behaviours, and personality and perceptions. The same is true of non-western attitudes. In addition, the lack of comparability among subjects from different cultural environments have suggested weaknesses in some studies which have in many ways left their scars.

The researcher's uncertainties, self interests or motivations and the variety of images of himself left in different cultures including differences in values and ethics have contributed methodological shortcomings which remain entrenched in some studies.

The problem of identifying and denoting cultural variables being studied has also been elaborated in subsequent sections within the context of cross-cultural psychology as a meta-method (the anthropological view) or as a methodology (mainstream psychological viewpoint). The multifaceted nature of the cultural variable, the emic-etic formulation and the ethnoscientific-experimental approach are also discussed in this section.

Finally, the procedures and designs used in many cross-cultural studies are discussed. As is noted, there is a need for greater sophistication in the treatment of data from cross-cultural research. Sampling procedures also present important problems. In many cases the lack of rigour in test development, inadequate techniques for isolating cross-cultural commonalities and differences, and the spurious attribution of causal relationship, have produced less than professional work in the field of cross-cultural psychology. Conversely, suggestions for improving design and data processing procedures as well as the symbiosis between cross-cultural and mainstream psychology are incorporated.

It is noted that certain topics received greater attention than others, primarily because the present writer has presented alternative viewpoints which required elaboration. One such topic which has been reexamined is the very popular theory of field-dependence and independence.

There are other less ubiquitous but important areas in cross-cultural psychology which are gradually receiving more attention. For example, underlying abilities which are reflected in test performance have been identified in many studies. The importance of ensuring the validity of conclusions about abilities warranted a longer discussion particularly the contribution of Buss and Royce (1975). In the same vein, Malpass' (1977) treatment of ways to strengthen cross-cultural conclusions was also considered worthy of greater elaboration.

The review is seen as spotlighting many areas in cross-cultural research which require refining, modifying or irradicating. If many of the invalidities, inconsistencies and inadequacies cited in the review are to be avoided, cross-cultural comparisons should involve the perspective of the indigenous culture rather than notions and activities derived from non-indigenous sources. Also, if cross-cultural conclusions are expected to be scientifically respectable, comparisons should be based on practical and proper statistical and other procedures.

An empirical study is reported in the present thesis. It is aimed at two areas, namely, short term memory (verbal and non verbal) and reasoning (verbal and non-verbal) in probing the patterns of similarities and differences as found within Sierra Leone (Freetown) and Canada (Edmonton). The researcher in this case is relatively bi-cultural. Interesting cross-comparisons will also be noted but do not form important conclusions except where functional and conceptual equivalences exist.

Nevertheless, the central purpose of the present study is an investigation of memory and reasoning within two different cultures. This general purpose has been realized in a series of experiments. The experiments were designed partly with a view to contribute to clarify the issues raised by previous research. These issues are outlined below.

1. Cole and others had investigated memory and reasoning among the Kpele of Liberia. The studies are partially "replicated," using younger subjects.
2. Luria (1971) used syllogisms to comment on the influence of socio-historical conditions upon the expression of higher psychological processes. His observations have been followed up in the two culturally different samples.
3. Das (1973) introduced a new construct, simultaneous and successive processing. The processes respectively involved the integration of separate elements in a spatially-related manner and the integration of separate elements in a sequentially related manner (Das, Kirby &

Jarman 1975). This theory of successive and simultaneous processing is utilized in this thesis in discovering whether individuals who perform better in successive or simultaneous integration are also respectively more efficient with information presented successively or simultaneously. In addition, by using proficiency in simultaneous and successive professing as a grouping criteron, performance in other tasks will be examined to see how important these processing skills are in aiding other cognitive skills.

4. Dawson (1967) using Witkin's (1962) approach applied essentially perceptual tests to investigate analytic and perceptual abilities (field dependence/independence) in Sierra Leone. The present study investigates analytic and perceptual abilities respectively using reasoning tasks and tasks requiring the use of specific modalities.
5. Wober (1967) suggested that field dependence tests unfairly restricted people in cultures with different "sensotypes." The present study is intended to explore the relationship of sensotypes with perceptual abilities and to attempt to identify Canadian and Sierra Leonean sensotypes respectively.

PART I

A SELECTIVE REVIEW OF CROSS-CULTURAL RESEARCH LITERATURE

CHAPTER 1

The Scope of Cross-Cultural Psychology

Numerous studies have been conducted under the rubric of "cross-cultural", "cross-national", "intercultural", or "international", which have attempted to investigate some dimension of psychological functioning in people from varying cultural or national backgrounds (Hoorweg and Marais, 1969; Marais and Hoorweg, 1971, Brislin, Bockner and Lonner, 1975; Price-Williams, 1969; Dawson and Lonner, 1974; Berry and Lonner, 1975; Berry and Dasen, 1974; Triandis, Malpass and Davidson, 1973). These studies and research projects, however, have numerous areas against which criticisms have been levied. Indeed the field of cross-cultural psychology has itself been defined and redefined in various attempts at delineating its boundaries. Jahoda (1970) distinguished between groups which would be considered to have a similar cultural background, such as the French and English, and groups with very different background and ecology, such as Ashanti and Scots. He considered that studies comparing the former groups would be "cross-national", whereas the latter groups would be involved in a truly "cross-cultural" investigation. Previous usage had tended to confuse the application of these terms. Subsequent usage appeared to have adopted Jahoda's distinction.

Cross-cultural psychology has had to describe its meaning and scope on the one hand, and on the other hand, it has had to justify its understanding of the other culture, whether as a dependent or an independent variable, and to establish the validity of the constructs applied in its methodology. These two aspects of the "growth pains" of a relatively incipient science has pervaded both earlier and more recent literature. However, the study of different cultures is not a new exercise with psychology. For example, as early as 1901 and 1905, Rivers had done an extensive study on colour vision and perception of geometric illusions during his Torres Straits expedition. What is relatively new is the formalization of this area of investigation as a distinguishable, but cohesive, part of mainstream psychology.

One of the first major steps that had been taken in this formalization process involved the institution of the International Journal of Psychology in 1966, followed by the introduction of the Cross-Cultural Psychology Newsletter in 1967. The introduction of the Journal of Cross-Cultural Psychology in 1970 was the next step and that year, the Directory of Cross-Cultural Research and Researchers was published. The first international conference of the International Association for Cross-Cultural Psychology (founded in March, 1972) was held in Hong Kong in August, 1972.

The rise of Cross-Cultural Psychology, from its earliest beginnings under the tutelage of sociology and anthropology to its present full fledged independent status, has certainly been remarkable. By the time the "identity crisis" in cross-cultural psychology had been resolved, it has become very clear to participants and By Standers that, "There is more to 'doing' cross-cultural research than hopping on a plane with a briefcase full of psychological tests" (Brislin, et al. p. 7, 1975).

If the question is seriously asked why cross-cultural, the answers would be many. For example, Triandis, Malpass and Davidson (1973) noted a variety of reasons including the desire "... to increase the range of our observation on variables of interest, to determine the variations found in subjective culture variables in different settings; to take advantage of natural experiments ... to study manifastations of psychological variables in different cultural contexts and to study cultures for their own sake..." (page 335). Mainly however, the motivations for cross-cultural research appear to have been the desire to establish the cultural generality of psychological processes and secondly, to unmask some elusive element that culturally mediates among behaviours and activities of mankind and makes them look very different. In the final analysis all cross-cultural researchers are probably engaged in the search for a "psychic unity" of mankind (Cole, Gay, Glick and Sharp, 1971, p. 214). Unfortunately, the approach whereby this search may be successfully executed is overgrown with value judgements and categories of description which sometimes unwittingly "go beyond the information given."

The problems that have been contemporaneous with the growth of cross-cultural psychology have been not only definitional, but basically methodological. However, this is not to indicate that this field has had an uncommonly stormy existence. The issues with which cross-cultural psychology has been faced have been no more fundamental than the whole field of psychology faced as it tried to establish its status as a science.

The ensuing sections will therefore deal with the various aspects of methodology which have been presented explicitly or implicitly in much of the literature in cross-cultural studies. The studies which are cited or discussed largely involve what Triandis et al. (1973) referred to under Section A of their overview, as "Person's Abilities" (Table 1, p. 360) - that is cognitive-type research as against personality-, physical-, social-, or interpersonal-type research.

In the end it is shown that the major aspects of the methodological problems facing cross-cultural psychology do require close attention and that their effect or conclusions and interpretations are not necessarily tangential.

Indeed these issues are central and fundamental to a proper understanding of other cultures. Attempts at overcoming certain problems are discussed and subsequent chapters present one more attempt at examining the influence of cultural context on thinking and memory.

One approach to describing the developments in cross-cultural research has been in terms of methodological adequacy.

Five important aspects of cross-cultural research will be discussed in this selective review.

(a) Test characteristics (i.e. appropriateness and general applicability)

(b) Subject characteristics (comparability with western groups)

(c) Tester characteristics (tester's culture vis-a-vis subject's culture)

(d) Characteristics of variables in previous studies (independent and dependent variables)

(e) Statistical procedures (methods of data comparability)

CHAPTER 2

Test Characteristics

Biesheuvel (1949) discussed certain characteristics of tests used in cross-cultural investigations. He criticized testers who, following Spearman's suggestion that the g (general) factor was not subject to cultural variation, had concluded that tests which did not involve s (specific) factors, but were based on g factors would be most effective cross-culturally. It would seem that specific factors had been defined in terms of language, schooling and socio-economic characteristics. Accordingly non-verbal test items which required no writing, calculating or reading, and included objects which had an equivalent use in a different culture were considered adequate as cross-cultural research instruments. These tests included blocks, form-boards, and perceptual tests which utilized diagrams or pictures. Biesheuvel pointed out, however, that many tests involved the use of paper and pencil (mazes, tracing, putting crosses, etc.) as a medium of responding in the research setting. This medium was usually unfamiliar or unknown to the subjects in non-western samples. In other cases, tests were presented in a pictorial form which made it possible for culturally familiar scenes to be included instead of unfamiliar ones. For example, in the Bennet

Mechanical Comprehension Test, men operating pulleys were replaced by women drawing water from a deep well. However, the pictorial medium was itself an unfamiliar mode of cultural expression. Familiar objects like a hut or a pot were not generally recognized pictorially. Pictures cut out of cardboard were no more meaningful than ordinary pieces of coloured cardboard. The use of geometric designs and patterns seemed to present problems, even when derived from the culture of the subjects. So then, not only was the paper-and-pencil aspect of such testing a stumbling block, but as well, the irrelevance of the test-demands to real life, appeared to have been a contributory source of problem in non-western settings. Errors in the perception of spatial relationship (e.g. unnecessary rotation, inversions which the subject appeared to have done unwittingly) led Biesheuvel to conclude that "... the task they set themselves was different from that which they were set by the tester... spatial position in a test which was abstract anyway did not appear to matter."

These problems found in tests which have been used cross-culturally are by now common-place, even if only lip-service is given to their importance. Together, however, these problems have presented cross cultural researchers with a new problem. That is the search for tests or materials which would not give an unfair advantage or disadvantage to any of the groups under investigation. As such the question of culture-free, later modified to culture-fair or culture-reduced tests was introduced. In effect the idea was to devise test items, which would be familiar and meaningful, as well as discriminating for the cultures under investigation (Strodtbeck, 1964). The underlying expectation of a pan-cultural battery of tests being "discovered" was always undoubtedly present. Frijda and Jahoda (1966) saw two problems in the way of this discovery. Firstly, non-indigenous researchers were unlikely to have the thorough familiarity with non-western societies that was necessary for the construction of tests and material that were at least biculturally meaningful.. Secondly, since it was probably impossible to have complete comparibility, subjective judgements as to what is comparable rather than objective methods would have to be used, and at best that would aim at producing "a reasonable compromise." Even if appropriate tests which can be administered cross culturally could be devised, there are additional problems to be overcome. For example, methods for identifying stereotypical responses would be required, so as to eliminate non-essential variances in test scores. Frijda and Jahoda, however, wondered whether the goal of designing culturally appropriate tasks is desirable. In this context the authors were referring to the frequent criticism against the use of unfamiliar items where these items are nevertheless discriminating along a known dimension. Maximizing the unknown or unfamiliar in cognitive tasks, however, seemed to have become an essential method by which psychologists measured levels of competencies in problem solving (Cole, 1973). Price-Williams (1975) suggested that both familiar and unfamiliar examples of problem-solving are important. He has suggested four "graduating steps" by which the task could be varied from the familiar (Step 1) to the unfamiliar (Step 4).

Vernon (1969), however, approached the question of the familiarity of tests to non-western groups from a different and perhaps unique viewpoint. He has recommended that tests developed in western contexts should be applied to non-western contexts notwithstanding their unfamiliarity. Vernon based this view on the belief that the western world had derived its better state of physical health, prosperity and technological competence from abilities which favoured success in formal intelligence tests. Using this western definition of advancement, Vernon believed that non-western societies should not only emulate these standards of civilization but should be evaluated by formal western intelligence tests in order to assist these societies to benefit from the fruits of western civilization. In effect, Vernon was asserting that the use of unfamiliar tests in a cross-cultural context was productive rather than counterproductive in describing intellectual abilities. However, according to Vernon, justification for applying western tests in non-western contexts would not constitute justification for making cross-cultural comparisons.

Vernon's argument appeared to imply that non-western abilities were inferior, less important or irrelevant when applied to the pursuit of self-determination, contentment and an orderly co-existence. Instead, all nations should realize these enduring attributes of civilization by adopting the intellectual and technological framework currently found in the western world, which according to Vernon, is superior by all standards.

Firstly, it seems that Vernon is justifying the introduction of western tests into non-western setting in ethnocentric terms. Secondly, the plan for uncritically adopting western technology can be questioned. There are alternate models for technological advance. For instance along the continuum of westernized and non-westernized abilities, where would one put those abilities that have been responsible for the technological development of Japan? In selecting aptitude tests as Vernon does, what would an African psycholigist opt for - British or Japanese? In any case, Vernon's ethnocentric approach with regard to the appropriateness of tests when certain abilities are being assessed cross-culturally, was to de-emphasize the importance of the cultural context of learning and emphasize for pragmatic reasons, their universal applicability. In this regard, the point made by Price-Williams (1975) is worthy of mention. That is, "... intelligence tests do not operate in a social vacuum; their applicability and proper management run parallel to social change and not across it" (p. 56). In summing up his views on the question of using intelligence tests in non-indigenous contexts, Price-Williams (1975) made the point that not only the form of the test, but also the intent of the test (and, we might add, testing) must be made clear to the subjects. Cole et al (1971) have demonstrated the significance of making the form or structure of the test recognizable to the subject.

Tests which are "culturally meaningful" are intrinsically less confusing than tests which are not and the evocations of intelligence tests are not necessarily demonstrative of the abilities the subject can muster in many more natural circumstances.

One type of research that has been considered important in cross-cultural psychology is based on Witkin's theory of psychological differentiation. One major concern about the Witkin type research is that it violates all the rules of familiarity and of the cultural appropriateness of tests, but still carries influence in its findings regarding the construct of field-dependence and -independence across cultures. There are other considerations. The measurements of this construct will be used to illustrate the problems associated with describing psychological functioning in a non-indigenous setting.

Psychological Differentiation in Sierra Leone

Since Witkin et al. (1962) explained the concept of psychological differentiation, some researchers have attempted to apply this concept together with its subordinate hypothesis relating to field-independence to samples derived from different cultures. One such attempt was the study by Dawson (Part I, 1967) conducted in Sierra Leone in which information was obtained about the "global" (in contra-distinction to the "analytic") perceptual style of subjects who all spoke a local dialect, Temne. It was believed by the author that the social expectations among this group produced a pattern of personality (and cognitive) functioning which exactly corresponded with Witkin's (et al. 1962) description of a field-dependent life-style. This, in turn, was evidence that functioning was at a lower level of psychological differentiation. Further to suggesting a confirmation of the theory of field-dependence among the Temne, Dawson (1967) stated that his data provided "considerable evidence... that the acquisition of perceptual skills was limited by the field dependence variable" (p. 117). The implications of the conclusions drawn from data obtained in this study were (a) that Temnes in Sierra Leone were limited in their perception and analysis of their surroundings since they operated at a low level of psychological differentiation and

(b) that having found themselves in this position their condition could hardly be expected to improve to any significant degree since this level or type of functioning imposed limitations on their ability to acquire further perceptual skills.

The future of the Temnes in Sierra Leone and other groups whose performance reflect an equivalent status, seemed rather depressing until other studies began to question the validity of the tests used to obtain measures or indices of field-dependence. Arbuthnot (1972) has provided some evidence that the Rod-and-Frame Test and the Embedded Figures Tests which were the original tests employed by Witkin, shared insufficient variance to be considered equivalent. That is to say comparisons of correlations obtained between the two tests have yielded a generally low mean correlation (e.g. .54). This has pointed to a relatively small amount of variance shared between the two (about 29%). This meant that it could not be asserted that the two tests individually measured the same specific ability as the other. They seemed to measure a general cognitive style or general analytic ability. But the specific nature of this ability is not derivable from scores obtained from either the Rod-and-Frame Test (RFT) or the Embedded Figures Test (EFT).

Arbuthnot (1972) indicated that the situation was even worse for the other tests which are modifications of the original versions. Further, some investigations have applied tests which were not derived from the original Witkin versions but which showed a similarity with these tests in their intention to measure the same dimension of cognitive functioning reflected in the field-dependence and field-independence construct. Such tests as the EFT and the Kohs Block Designs (used by Dawson in the Sierra Leone study), were reported by Arbuthnot to show a closer relationship with each other than with the original Witkin tests. Thus Arbuthnot concluded that these tests could not be said to similarly measure field-independence alone, "but rather... some varying combination of field-independence and other abilities or characteristics tangentially related to the construct" (p. 486). On the basis of his analysis, however, Arbuthnot recommended that the original versions of the RFT and EFT should be used to give a more reliable estimate of field-independence. On the other hand where only one test is possible, the RFT is preferable to the EFT "... due to test characteristics of the EFT which enhance anxiety" (p. 487).

Dawson (1967) used the EFT and Kohs Block Designs (KBD) and both these tests would seem to provide, at best, speculative information relating to the field-independence construct.

Another reason why the EFT should be avoided was provided by McFall et al. (1970). It seemed that subjects differentiated on the basis of the Thurstone and Gottschaldt versions of the EFT (Thurstone, 1944) showed marked experimeter expectancy effects whereas those differentiated on the basis of the RFT did not. That is to say that the variables which favoured the separation of subjects into field-dependent and independent groups were closely related to the variables which made the same subjects susceptible to experimenter expectancy effects. Thus a sample among which the EFT could discriminate between field dependence and independence would be a sample highly susceptible to experimenter expectancy effects.

An additional facet of the McFall study which was pertinent to the use of the EFT in the Dawson study, was the utility of Rosenthal's Photo-Rating Task (PRT). Dawson (1967) used the assessment of three-dimensional photographs as a further evaluative technique (and one which appeared central) in establishing field-dependence among the Temnes. It seemed significant to the present writer that the performance conditions in which the McFall test (Concealed Figures Test) was observed to indicate that subjects were susceptible to experimenter expectancy effects also involved the assessment of photography (though the nature of the assessment was different in both instances). The EFT - Photograph-assessment associations with expectancy susceptibility, however, remain prominent.

McFall also showed that the RFT was a more reliable measure of 'analytic functioning' since, among other attributes, it was not susceptible to experimenter expectancy effects. Finally the substantial relationship between the need for achievement and susceptibility to examiner effects during photo rating tasks would seem to require caution with interpreting performance based on such a rating task as indicative of a cognitive-centered rather than a behavior-centered idiosyncrasy.

It is being suggested here in effect, that there was the possibility that performance on Dawson's 3-D picture assessment test involved (confounding) variables whose effects were probably less (or only peripherally) demonstrative of the cognitive functioning of his subjects than of other (related) factors present during the experiment such as desirability or anxiety.

Wachtel (1972) has re-examined Witkin's theory of psychological differentiation and has noted that two strands are woven together in this hypothesis.

(a) It refers to a style and direction of development which derive from the organization of personality, and

(b) it refers to abilities and the across-the-board quality of certain developmental limitations upon these abilities.

As Wachtel noted, these two aspects have not been usually differentiated in discussions and conceptualizations of psychological differentiation. This point by Wachtel suggested that the intention of Witkin's hypothesis was to create a methodological rapprochement between the two strands. Subsequent work, however, has proceeded by assuming this rapprochement as self-evident. Dawson's attempt at reconciliation is commendable but his procedures have confounded this effort. Further, Wachtel (1972) contended, as did Arbuthnot (1972), that there was no solid basis on which to conclude that the tests which show a positive correlation with the RFT and EFT, accurately assessed field-independence since it has not been demonstrated that the shared variance reflected by such correlations included field-dependence.

Wachtel (1972) also suggested that the effects of intelligence should be controlled in such experiments since a person's "analytic" potential would be expected (as measured by Block Designs) to be differentially affected by his over-all IQ score. Care, Wachtel (1972) pointed out, has not been taken to discover whether superiority in other specific aspects of intelligence would produce similar associations with the field-dependence hypothesis. Dawson's measures for intelligence were not intended for investigating these relationships which Wachtel considered possible. Wachtel (1972) further argued that the concept of field-dependence was limiting in its ability to determine a subject's strength. For example, field-dependence according to him indicated what a person lacked or something he could not do. However the current tests of this construct, being indices not of total functioning as believed but of one aspect of an over-all approach to dealing with the external environment, would be best viewed as ability tests. Thus their inability to identify other abilities for which they were not constructed would become readily appreciated.

The importance of this point has been highlighted by Wober. Wober (1966) has suggested that the modality to which emphasis of performance has been put in tests of field-dependence might not provide any advantage to subjects from cultures which emphasize other modalities. He has introduced the concept "sensotypes" into this context to argue that "the prevailing patterns of childhood intake and proliferation of information from various sense modelities differ according to the culture" (1967, p. 31). Thus the elaboration of certain abilities among some African groups showed an emphasis in a perceptual domain (proprioceptive) which is quite different from that emphasized in Western-European cultures (visual). The RFT and EFT which measure field-dependence required a perceptual ability which utilized the visual modality under unusual proprioceptive conditions. As such these instruments seem to lay emphasis on a domain which could relatively adequately assess functioning in a Western-European culture. Wober (1966) contended that in an African context these tests may not be permitting subjects an opportunity to show what they were good at. Wober's (1967) study strengthened the notions in his 1966 analysis. In this study he compared the performance of Southern Nigerians with North Americans on aspects of the RFT which permitted an inspection of the role proprioceptive abilities played in 'analytic functioning'.

He found that Nigerians consistently performed better in problems requiring the resolution of proprioceptive as against visual displacements from normal conditions. A comparison of correlations between the RFT and EFT for both Americans and Nigerians showed no relationship between performance requiring largely proprioceptive abilities and performance requiring visual abilities. When performance required principally visual abilities, a significant relationship was observed between RFT and EFT for American dancers - - whereas ordinary Americans had different results. This seemed to indicate that unique relationships existed between abilities, relative to their pattern of inter-dependence as required by varying cultural or learned conditions. Quite clearly, Wober (1967) showed that careful comparison of groups and measures did indicate that visual tests were not the sole indicators of levels of psychological differentiation. The RFT and EFT as Wachtel

(1972) pointed out individually measured, at best, one aspect of perceptual ability. The RFT by itself, in the absence of comparable data, could not be expected to yield accurate information regarding an individual's total level of perceptual functioning. The same was true of the EFT. In addition, the EFT did not necessarily require the same abilities as did the RFT. Whatever the ability that the EFT measured it would not be a reflection of the abilities required for performance in the RFT. This seems to be the upshot of Dawson's study. The use of the EFT (Dawson used a modified version) and Koh's Blocks meant side tracking the abilities expected in the Temne sample and (if Temnes belong to the same sensotypes as Nigerians) assessing skills which were probably not germane to the Temne's basic perceptual style.

The limitations then that Dawson thought field-dependence imposed on acquisitions of perceptual skills were in reality those limitations which the tests he used imposed on a true assessment of the subjects' level of functioning.

The Temnes in effect did not lack or show a defiency in 'analytic abilities' on the whole. Wober (1967) and other studies have shown that 'analytic' functioning is not foreign to Africa. What the Temnes lacked was a specific type of visual 'analytic' ability which western cultures seem proficient in and probably which the Mendes of Sierra Leone also excelled in (Dawson, 1967). It still has to be demonstrated, however, how important this specific ability is, not only for Africans but for Europeans, too. The fact that they possess this ability would not necessarily mean that it is important relative to numerous other survival potentials that Europeans and non-Europeans possess! If one had some certain knowledge of the importance of this construct in the development of intelligence or self-actualization, one would perhaps begin to assess its cultural appropriateness and the need for more suitable test materials.

In addition, the heuristic importance of the field-dependent hypothesis for cultures other than Western-European is seriously questioned. The upshot of the foregone argument has been to show that certain tests of field-dependence as they have been used are not suitable for an adequate appraisal of total perceptual functioning, especially as found in non-western cultures or groups which may not belong to the same "sensotype." The question arises that if the tests which supposedly reveal one's level of psychological differentiation are not applicable, would the theory which the tests supposedly translate into concrete psychometric terms be expected to apply? Assuming that it could be applied and that the tests were merely a wrong translation of the theory, how could the theory be verified at all in the absence of a suitable test?

It is probably true that the theory on which field-dependence and field-independence has been founded, has more potential than has been realized. But it would seem that its intention of relating personality variables with intellectual ones has more generality in western societies than non-western societies. That is, it is suggested that the concept of psychological differentiation might not apply cross-culturally in the same way. For example, the "deficit" in functioning which low psychological differentiation implies for one culture could well indicate the "strength in another culture. And the situations in which context dependency can be assessed in one culture may not necessarily be the same situation for a different culture (Witkin and Berry, 1975). For example, the context in which conformity and individualistic tendencies are assessable are not identical in many cultures. However, without reliable means of measuring the relative effects of various tendencies, abilities or potentials as they apply in specific contexts, any comment as to their effectiveness or ineffectiveness in enhancing or retarding intellectual or social progress amounts to speculation. Thus to consider perceptual functioning in terms of the field-dependent theory might not provide profitable results for yet another reason. That is, if the field-dependence theory is not applicable cross-culturally, results obtained in a non-western culture using the field-dependence criteria might well be meaningless.

In summary, one finds the areas of testing in cross-cultural psychology relatively problematic because of the need to ensure cultural familiarity and appropriateness of the tests employed. Ethnocentrism is sometimes confused with pragmatism, though the former has all but disappeared in current cross-cultural literature. The question, however, of the cultural validity of certain, theoretical constructs appears to be still in need of clarification and demonstration.

CHAPTER 3

Subject Characteristics

In cross-cultural studies many different cultures and sub-cultures have been, by definition, investigated for both unicultural and cross-cultural findings and discussions. The centre of every investigation has to be the human subjects utilized in these studies. For example, the Banga people of Uganda were studied for their conceptualizations of intelligence (Wober, 1974) and Cole, Gay, Glick and Sharp (1971) studied thinking and memory among the Kpele of Liberia. These are only two examples of the many studies that could be cited (for example, Berry and Dasen 1974, Price-Williams 1969 and Vernon 1969). These studies, however, are illustrative of two different types of investigation, which seek to describe a group of people in certain special terms. The exercise is nothing new, but conditions under which this excercise takes place are different in the developed nations from those in the developing nations.

In countries which have attained a very high standard of literacy and information standardization the three areas of study being attempted cross-culturally (Wober 1974, Cole et al. 1971) have been developed into consistent if not totally scientific fields of research and knowledge. Respectively one encounters very erudite conceptualizations of intelligence from which something akin to a cult has been built over almost one and a half centuries in the United States, England and the European continent. Thinking and memory are defined within cognitive psychology which is an established discipline in many universities of the Western World.

While many of the old beliefs in these areas have been subject to close scrutiny by modern research methods in the West and are being accepted, rejected or replaced, countries in which literacy is relatively recent are being introduced to these investigations only now. As a result what is by now part of the general corpus of knowledge about mankind in more advanced countries is still a matter of speculation and hypothesis-testing in economically less developed countries. In such an atmosphere studies such as Wober's (1974) and Cole's (et al. 1971) acquire the status of pronouncements when they should really be hesitant probes into yet unknown phenomena.

However, it is significant to understand as many characteristics of potential subjects or samples as possible in cross-cultural psychology. To this end Wober (1974) asked a number of questions, which his data seemed to raise. Do Africans utilize a more conservative-radical, whereas Western culture utilize a more change-radical model of intelligence? The former referred to the pursuit of the ideal of maintaining or enhancing to the highest degree those skills and perceptions which will preserve, in tact, the network of traditional value systems. The latter referred to the ideal of producing change through innovation. If there are such fundamental cultural differences in conceptualizing ideals and aspirations, what other important and perhaps radically different notions in different areas of life could there be? For example, do some cultures differ in their cultural models for competition? Biesheuvel (1949), discussed the importance of ensuring a positive attitude on the part of the subject in a cross-cultural study. He proceeded to state that "the competitive spirit is not as strong in non-European as in European groups... The non-European will therefore not be greatly concerned about doing well in order to beat his fellows, unless of course he has acquired an European outlook"(p. 68). Is it possible that Biesheuvel's observation was biased on his own cultural understanding of what constituted competition and under what conditions to expect a display of that characteristic?

Triandis (1975) in his discussion of culture-training and its influence on interpersonal relationships noted that certain social settings evoked specific behaviours or responses which are culturally prescribed. His example was of a person in church whose role expectations demanded conformity whether or not the person felt inclined to participate at that time. It may well be that certain African subjects have been culturally trained to act intelligently by being respectful (respect being one manifestation of intelligence Wober, 1974, noted in Uganda), and by not evincing a competitive aggressiveness that might seem immodest in the presence of strangers, or guests. On the other hand "prudence" (reported by Irvine, 1969, to be the Shona word for intelligence) was probably exercised always and tended to camouflage the expression of competitiveness, rendering the latter unrecognizable to a non-indigenous observer.

In the area of thinking, cognition, and conceptual development, Cole, Gay, Glick and Sharp (1971); Cole and Scribner (1974) and Cole (1975) have continued to stress the importance of understanding the people being studied from the latter's point of view, if any meaningful knowledge should emerge in cross-cultural psychology. Cole et al. (1971) recommended the ethnographic approach to learn about the people being studied, prior to the experiments being done, "... in order to identify the kinds of activities that people often engage in and hence ought to be skillful dealing with" (p. 217). Ethnographic data is not only important for determining the cultural appropriateness of the research but also as a standard against which to judge the validity of the conclusions and interpretations arrived at from the study. Berry's (1975) subjects comprising low-, medium-, and high- food accumulating groups, would probably react differently to tests of, say, categorization which included food items. Thus, in a study which included these groups and where the research was not designed to identify or delineate them in Berry's terms, there would probably have been a confounding influence on categorical thinking, stemming from cultural characteristics of the sample or samples.

It is these cultural characteristics, which to the mind of the foreigner, are either totally meaningless or partially imbued with magic or primitive irrationality, that led many early researchers to describe their subjects in misleading, undignifying and sometimes insulting ways - often in the name of science, that is, information derived from their "findings." Bentley (1929, page 26) is attributed with this statement (Cole & Scribner, 1974, p. 141):

> The African Negro, or Bantu, does not think, reflect or reason if he can help it... the reasoning and inventive faculties remain dormant... a careful, thought-out plan or clever piece of induction is beyond him.

Levy-Bruhl (1966) had explained the Western and non-Western minds as differing in respect of the influences on them of their respective collective representations. The latter were a set of general beliefs which characterized a culture. The western mind was almost exclusively intellectual and could clearly distinguish this from motor and emotional aspects of life. The primitive mind of the other hand showed little evidence of the separation of various beliefs from emotional elements.

Levy-Bruhl (1910, p. 25), like Bentley, seemed to have been convinced that the nonliterate person always sought ways of being relieved of the effort of thinking or reasoning (Cole et al. 1971, p. 111). Even more recently, Vernon (1969) distinguished Africans from Europeans in these words:

> But the major differences between African and Western intelligence probably arise more from the emphasis on conformity and social integration as against individual responsibility and internal controls; and from the acceptance of magical beliefs which inhibit analytic perception and rational thinking (p. 224).

It is truly mystifying how Vernon could make these statements both about the Western "mind" and about the African "mind." There seem to be obvious contradictions between these statements and this author's knowledge of labour unions, political parties, and law courts, in England, Canada and the United States. These are established institutions that promote and maintain conformity! Conformity and social integration did not seem to have consistently characterized the life style of those African countries which have gone through various military coups d'état and counter coups d'état. From a less confused standpoint, however, Cole and Schribner (1974) emphatically state that:

> ... there is no evidence in any line of investigation that we have reviewed, that any cultural groups wholly lacks a basic process, such as abstraction or inferential reasoning, or categorization... (p. 143).

That the role of ethnographic analysis is to serve as a goal as well as a guideline for research is clear. However, once outside the realm of anthropology where the rules have been formalized, new ethnographies in psychological studies would require validation to be acceptable as authentic reports.

The upshot of this discussion has been to point out that various descriptions of the people (largely non-European), included in cross-cultural studies as subjects have turned up in certain studies. However, too often, the characterizations of these subjects have been biased by some explainable or inexplicable viewpoint on the basis of the type of research methodology or the researcher's own background. Some sanity has been brought into the issue by use of ethnographic analysis and some searching questions relating different manifestations of similar processes or behaviours,observed among cross-cultural subjects, have been raised. With the widespread use of the ethnographic method the problem of authentic data would probably arise.

However, whether or not what researchers have to say about the subjects they encounter in their studies is valid, these subjects do have behaviours and personality characteristics which may affect their performance during the experiments. In addition, the researcher may not be aware of these effects in some cases, because they may be cultural idiosyncracies or situational facts that remained unexplored. For example, Triandis and others (1972c) found that some black subjects had a tendency to assume that all white persons were prejudiced against blacks. Vernon (1969) reported Ramphal's (1962, unpublished) study indicating that lack of school spaces for Indian children in South Africa delayed their school entry for two or three years. It was further noted that in many parts of Africa missing school resulted in late graduation from primary school until as late as age 18 to 20 instead of 13 to 15 which was usual. These reports would seem to point to major sources of confounding influences due, in these cases, to negative interpersonal relationship between tester and subject on the one hand and on the other hand to differences in educational levels at various points in life between samples, such as between certain African samples and certain samples, from say, Britain and the U.S.A. As such it would require rigorous matching procedures in order to achieve sample comparability in those studies which depend on this, among other things, for proper inferences.

CHAPTER 4

Researcher Characteristics

When Michael Cole set out for Liberia he took with him "an invisible cargo of assumptions about human nature and human learning" (Cole, 1975, p. 157). He described his experience on arriving in terms that would probably conjure up a classic picture in the mind of many cross-cultural researchers. He wrote:

> The list of things that the tribal children could not do, or did badly, was very long indeed. They could not tell the difference between a triangle and a circle because they experienced severe perceptual problems. This made the tribal child's task almost hopeless when it came to dealing with something like a child's jigsaw puzzle, explaining why "Africans can't do puzzles." I heard a lot about the fact that "Africans don't know how to classify" and, of course, the well-known proclivity of African schoolchildren to learn by rote came in for a lot a discussion.
>
> The source of these difficulties? A college physics teacher suggested that AID buy tinkertoys for every child in Liberia. Almost everyone had a favorite deficit in the child's experience which, if rectified, would greatly benefit the educational products of Liberian schools (p. 158).

Guthrie (1975) on the other hand, presented again, what must also be a classic picture of the research sojourner's experiences while in the new culture. He wrote:

> Learning to live in an alien society is much more than learning to speak a strange language, to eat unfamiliar food, and to observe

> different social customs. It involves a subtle but important change in one's expectations of oneself and of others and in the controls one feels over his emotions. One has to learn to do many new things and to stop a number of actions that are of long standing. But, more important, one has to cope with a loss of identity and familiarity and to get along without some of the social events that provide encouragement, direction, and meaning to our lives (p. 95).

A somewhat different, but equally realistic picture is suggested by Frijda and Jahoda's (1966) description of the foreign researcher's image in developing countries. The description left the unmistakeable impression that the tester of psychological investigator was usually considered to be a powerful person, sometimes because of his partnership with or influence over the foreman or boss of the potential subjects and sometimes because researchers and white foremen were seen as agents of the government who could bring fortune or misfortune to the indigenous people.

It would be understandable how these three features of a foreign researcher's previous assumptions, feelings of insecurity and uncertainty, investments of power and influence if not modified and in some cases conquered, could greatly affect the manner in which the research was conducted, assessments of the responsiveness of the subjects are and how interpretations from the data are obtained. One could deduce that all three characteristics have sometimes been expressed negativistically in the same individual as omniscience, distrust, and chauvinism, on the one extreme, and on the other extreme as overscrupulousness and paternalism. But also there would be positive expressions of these characteristics, such as an honest knowledge-seeking approach, collaboration based on frankness, mutual respect and recognition of and appreciation for contributions to the researcher's achievements or insights.

The situation in cross-cultural research could be much more complex than so far described. Researchers have various motivations in "going cross-cultural" and their behaviour has sometimes left a trail of dissatisfactions in non-western countries. Among the motivations to engage in cross-cultural work, the concern to establish the universality of psychological theories must be very high (Triandis, et al., 1973, Malpass, 1977). But a number of ethical problems ranging from exploitation to concoction, could be exposed if all the facts were known. Suffice, however, to state that at the conference called "The Interface Between Culture and Learning" held in Hawaii in 1973 (Brislin, Brochner and Looner, 1975) the question of ethics in cross-cultural psychology was reported to have been "a recurrent theme." It was felt that "If nothing of value is left behind, the culture does not benefit from cross-cultural research" (p. 8).

Ethical guidelines were seen by Brislin, et al. (1975) as very important in view of the unfavourable reputation of some cross-cultural researchers. They suggested that not only for ethical reasons, but also for methodological and practical considerations an approach involving collaboration was essential. Such collaboration, however, should be based on mutual respect and honesty at every step of the research since its inception, so that meaningful and unbiased information may emerge rather than artifacts and ethnocentism. The authors further suggested six guidelines which were so well expressed that they will be quoted here almost verbatim.

> (1) A research problem should be defined in collaboration with a member of the "other" culture. Ideally, the discussions should be conducted in both locations. Topics should be of theoretical or practical interest in both cultures.
>
> (2) When "on site", the visitor should work with a local research colleague on an equal-status basis. If there is no such person available, then he should train promising people, giving special attention to teaching skills (e.g. survey methods) that could lead to the permanent employment of the assistant after the project is completed and the researcher has returned home.
>
> (3) Joint publication should be the norm rather than the exception. Senior authorship should rotate between the team. However, as H. VanBuren (personal communication) reminded us, the researcher should make certain that co-authorship is a desired commodity. In some cultures joint participation at a scholarly meeting might be more valued. The researcher must be sensitive to the preferred method of information dissemination, and be prepared to adapt to the local system.

> (4) In some cultures, the "pure science" approach, in which the primary and only aim is to test some theoretical model, is seen as being too "precious." ... With educational research, health education, conflict resolution, cargo cultism, population control, and other similar bread-and-butter issues crying out to be attended to, some outsider's pre-occupation with theory construction may not be appreciated. The wise theoretician will achieve a compromise solution to his problem by designing studies that have both a theoretical and practical yield. Not only is there then something for everyone, but, according to Lewin, such studies are the best kind, anyway.
>
> (5) If possible, itinerant social scientists should adopt a variant of the Peace Corps model, and try to become members of the community in which they are working. In particular, they should be sensitive to some of the less obvious effects of their behaviour. For instance, on his recent research visit to Indonesia, Bochner noticed that, on the one occasion when he arrived at an informant's home by hired Mercedes, his reception was subtly different from the treatment he received when travelling by betchak or on the back of a local friend's motorcycle.
>
> (6) Sometimes researchers can use their findings to help or become an advocate of another culture. ... some cultures will welcome researchers if it is considered that the visitors will "speak to the world" through their research. Similarly, the leaders of some cultures have come to appreciate the older ethnographies, because in many instances such documents are the only existing materials available for use in teaching the culture's history to the current generation... (pp. 11-13).

Whether or not researchers adopt these recommendations would probably depend on the type of researcher.

Seven types of researchers have been described by Tamgumpay-Castillo (1968), to which Brislin, et al. made reference (pp. 9-10). These were:

> The "data exporter." He is, in the words of Professor Alex Inkeles, the fellow who does research "safari style." He takes everything he can by way of data and leaves nothing of value to the country of study. Sometimes he is called the "hit and run" researcher, with more "runs" than "hits." If research were a movie with a plot, he would easily be the villain.
>
> The "hypothesis-tester" and "theory-builder." He has some theory as to how development proceeds, and his aim in overseas research is to add as many cultures or societies to his sample as he can in order to arrive at a universal generalization.
>
> The "greenhorn." We can usually tell the newcomer from the "old-timer." The former has THE explanation, the latter has only a hunch.
>
> The "idea-stimulator" and "research-facilitator." He is a real gem. Professionally secure, very competent, he has no great compulsion to see his byline. He asks the right questions so that we may figure out for ourselves what the right answers might be; he assists in obtaining research support so that these answers might be forthcoming. Most of all, the research project is ours, not his. The only flaw of this precious gem is that he is such a rare specimen.
>
> The "penny-collaborator." He happens to have access to some money, not too much, but some. "How about a cooperative project?" he says. "I'll provide the money and you do the study."
>
> The "professional overseas researcher." To him, overseas research is a way of life. He lives from research grant to research grant. "Tough life," he says, "I can't stand the winters in New York anymore."
>
> The "CIA scholar." Everyone says he exists and is reputedly doing an excellent piece of basic

> strategic research, but it is impossible to describe him because like the "Invisible Man" we cannot see him (Tagumpay-Castillo, 1968, pp. 30-32).

Being human beings, the best of researchers will have value judgement and moral reactions to various situations encountered in different cultures. But, here too, there are differing shades of expression, and sometimes very marked differences in the value or moral judgements made by cross-cultural researchers. The experiences of the earlier groups of American Peace Corps Volunteers in the Philippines (Szanton 1967) reported by Guthrie (1975) reflected the clash of values systems, that is American work ethic versus Philippine hospitality ethic. To the Philippines the presence of the Americans was in itself a sign of interpersonal achievement; expectations to engage in further show of togetherness or commitment by working was almost embarrassing. To the American once the welcome was over (the briefer the more acceptable), it was almost unethical not to proceed with the real reason for the visit, that is to work. In this context the American found himself as a learner. And, although the concern of conserving one's identity through the learning process led to serious questions and conflicts, there were successes in mastering the new language and the predictability of a different culture.

Differences in moral values have been considered from a different point of view. Vernon (1969) referred to the Indian and Eskimo child in school whose "upbringing has done nothing to build up the internal moral controls of the white" (p. 193). There is clearly a glimpse of "the moralizing" Westerner in this quotation. Also in his discussion of the cultural differences between Western civilization and (East) African social systems Vernon stated that because of communal consciousness and magical beliefs among the East Africans "all controls tend to be external, not internalized... the sense of personal responsibility and conscience (with the consequent neurosis) of western civilization are lacking" (p. 177). Again, Western morality appeared to be the model, neurosis and all!

Even more interesting was this description. "... actions are not wrong if not found out, only if they affect the relations of the individual with his group" (p. 177). This did not appear to distinguish the East Africans in any major way from many other societies. Wrongdoing perhaps in all cultures if undiscovered would probably remain unknown; in many socieites, Western or not, wrongdoing is defined within the context of its effect on other individuals in the group. Vernon was probably inferring a distinction between East African society and Western society from a subjectivelly defined notion of Western morality. Suffice to say that Vernon appeared to be overgeneralizing and the source of such a fallacy would probably be found among the "invisible cargo of assumptions" imported into East Africa.

In summary then, the researcher in a cross-cultural setting is beset by internal and external psychological forces, by situational demands and conflicts and by varying values and identities. But as a researcher he has had to find ways of adjusting to these inevitable aspects of cross-cultural work. In some cases, the research would not suffer; in other instances, however, various characteristic features of a researcher's juxtaposition with or emersion in, a different culture would definitely produce methodological shortcomings in the research project.

CHAPTER 5

Variables in Previous Studies

The discussion so far has presented some special characteristics of actual or potential samples in cross-cultural studies. It has also discussed some special characteristics of researchers as aliens or sojourners in a different culture. The intention has been to present a picture of the complexity of the interaction between researcher and subject, which is further complicated by the nature of the medium of such an interaction. This medium of interaction is the testing and test situations which have also been shown to have complexities and unknowns. Within this farrago of values, assumptions, needs and interpretations there arises yet another issue, that is the question of conceptual and functional equivalence in category systems as perceived in cross-cultural psychology (Berry 1966 or, 1972). In effect one may ask from what background of information and experience does a researcher define and approach the variables he proposes to study in a cross-cultural context? To answer this question, we should take a closer look at the description of cross-cultural psychology. Some writers (e.g. Eckensberger, 1973; Malpass, 1977) have considered research in a cross-cultural context as a research strategy. That is, as a methodological strategy, cross-cultural research has used the concept of culture as an intervening variable or an hypothetical construct. In these terms then, cross-cultural research would become "the explicit, systematic comparison of psychological measures under different cultural conditions..." (Eckensberger in Nesselroade, 1973, p. 45).

Some other writers, however, (e.g. Brislin, Bochner and Looner, 1975) would disagree with this view. They have explicitly stated that "cross-cultural psychology is not a theoretical framework... not an experimental method nor a class of dependent variables. Cross-cultural study is a meta-method..." (p. 7).

Using the first explanation of cross-cultural research one would proceed much the same way as Cole and his colleagues (1971, p. 23). They were guided by previous data and research that had been based on the hypothesis that human beings have a limited, but definite capacity for information processing. They tried an experiment on the Kpelle of Liberia whom, they interpreted, performed differently, but clearly less competently than did previous American college students. However, as Brislin et al. (1975) indicated a different cultural setting cannot be an intervening variable to explain phenomena in another culture. Transfer of research methodologies from one culture to another involves assumptions which could and do sometimes distort the essential character of the variables being studied. Conversely cross-cultural comparisons could and do sometimes produce new or different understandings of the roles that these variables could acquire under different cultural systems. In effect when a researcher presents a subject with a variable in order to observe their interaction in a different cultural setting, not only is it plausible that the subjects could proceed to interact with a different variable that the researcher was unaware of, but it is also quite plausible that the subject's interaction may reflect nothing that the previous hypothesis and data have indicated. In either case, establishing the identity of the variable with which the subject does interact would be crucial to any interpretation or deductions about processes or patterns of psychological functioning. Added to the problem of determining which variable is being reacted to (both when the behaviour is 'conventional' and when it is 'unconventional') is the problem that the researcher's point of view would in any case be restricted by the constraints of his hypothesis. Both problems are a direct result of treating cross-cultural research as a methodological strategy. Strodtbeck (1964) would like an alternative to the hypothetical-deductive inferential paradigm for just these reasons. That is, inferences derived through hypothesis testing tend to limit the generative role of the research in producing alternative hypotheses, in elaborating unsupportive or surprising findings and in readily abandoning original hypotheses. Strodtbeck's suggestion of R-inference or of retroduction as an alternative to hypothetico-deductive reasoning stressed that the epistemological power of inference derived not from the source of inference, but from the logic of inference.

In effect those who propose that cross-cultural psychology is a methodology expect the researcher to rely on previously formulated hypotheses and to make inferences and deductions that will throw light and will provide bases for further elaboration of previous theory or hypotheses. Those, on the other hand, who propose that cross-cultural psychology is a meta-method would expect the researcher to use previously formulated theory as only a springboard or a vehicle for further or different discoveries and inferences. The former group would seem to be in search of universal man on the one hand, and on the other, their theory results in the juxtaposition of culturally comparative models. The latter groups would on the one hand be in search of new identities and on the other hand their theory results in the juxtaposition of cultural reference points.

The attempts cross-cultural psychology has made to explain universal and esoteric phenomena have all contributed to its uniqueness as a science and as a discipline, but moreover have served to multiply the puzzling questions about universal man; or is there such a creature?

Certainly, cross-cultural psychology's findings have not answered the question clearly. For example, many studies have shown that most children conserve quantity by age seven in Switzerland, United Kingdom and North America. However, the age at which children in "preliterate" societies acquire the concept of conservation may vary from the same age as children in western countries to as late as eleven years old (Dasen, 1972). Also, in western societies, the sequence of the acquisition of conservation involves first quantity followed by weight and finally volume. This sequence would demonstrate "horizontal decalages." In some non-western societies, however, the sequence may be different. DeLemos (1966) found that weight was conserved before quantity among "aboriginal" children in Australia.

Did the children in non-western countries perceive the problem in the same way as those in western countries or did cultural training indeed produce the differences? Does culture involve certain learning mechanisms which will always mediate between variables (or experiences) and performance (or behaviour) or is culture itself a variable that can be controlled? Again, these questions highlight cross-cultural research as either a meta-method or a methodology.

The discussion so far is intended to describe the intricacies involved in defining and manipulating the experimental variable in cross-cultural research.

The two schools of thought referred to earlier are probably represented by no others than developmental and experimental psychologists on the one hand and experimental anthropologists on the other. Psychologists would fall on the side of culture as methodology whereas anthropologists would fall on the side of culture as meta-method. To the former culture would be defined as a laboratory. To the latter culture would be defined as historical and geographical phenomena.

Regardless of how the proponents of the different points of view proceed, the issue of establishing the unmistaken identity of the variables being studied would still exist.

However, some conditions have been identified which could militate against the identification of these variables. Cole (in Brislin et al., 1975) noted some distorting conditions which mask true cultural effects. Both from Cole (1975) and in other circumstances, the impression is conveyed that the subject may be faking, bored, secretly unclear about the task, or confused by linguistic or conceptual parallels which have different meanings for researcher and subject alike; the subject may be afraid, under some pressure not to cooperate or may make assumptions about the expectations of the research, wrongly or rightly, and attempt to ingratiate the researcher or peers. The experimental task could be a poor analogue of daily activities and hence fail to trigger normal or natural responses from the subjects. But then despite reasonable congruence between the task and the real situation the subject could fail to make the connection and therefore would confound attempts at interpreting responses in those contexts as constructive.

Price-Williams (1975) examined another aspect of the problem of drawing conclusions from observations in cross-cultural research situations. Price-Williams made the point (by way of illustrating the complexity of denoting cultural influences) that perceptual processes may be mediated by cultural factors, but the problem becomes greatly complicated when one seeks to specify exactly which cultural element influence which perceptual process (Price-Williams 1975). In illustrating this point further, Price-Williams used the findings of studies relating to different groups' susceptibility to geometric illusion. It was noted that the cultural variable -- encompassed by the term carpentered-world hypothesis -- was thought to have been identified as explaining the mediating factor in differences in illusion perception among different cultures. However, the physiological variable noted by Pollack seemed to confound this variable. Pollack (1973) had indicated a correlation between macular pigmentation and the ability to perceive contours. This suggestion (of an intervening physiological variable) clearly introduces a confounding element into the previous explanation of cultural differences in susceptibility to geometric illusions as based on ecological influences. Further fragmentation of the carpentered world hypothesis was produced by Jahoda's (1966) finding, and conclusion, that the differential ability in interpreting two dimensional figures as found among the Ashanti, Dagombi and Lobi, respectively, in Ghana was essentially responsible for differences in susceptibility to the Muller-Lyer and horizontal-vertical illusions. Thus, we are now faced with a cognitive variable, rather than an ecological or a physiological variable.

Using another illusion, the Sanders parallelogram, Stewart (1973) had concluded upon yet another variable, namely, sex of subject. Finally the study by Bonte (1962) and other studies so far mentioned seemed to raise the question that different types of instrumentation could have been responsible for the differences so far indicated. This might be yet another variable! Price-Williams (1975), intended to indicate the complexities that must be associated with identifying that elusive cultural variable which would explain cultural differences in performance. While his discussion served to illustrate sources of variance which could complicate interpretation of cross-cultural performance, it reinforced the need for a way of establishing the identity of the real variables as against the hypothesized variables being studied.

Two approaches have been suggested to minimize the problem of major confounding influences arising from differences in conceptual and functional categories in cross-cultural research. These are the emic-etic rapprochement suggested by Berry (1969a) and the ethnoscientific-experimental rapprochement suggested by Cole et al. (1971). Berry (1969a, 1976) and Cole et al. (1971, Cole and Scribner 1974) have exemplified the use of their respective approach in many studies. The following is a brief description of the two approaches.

Berry (1969a) proposed three stages as prerequisites to effecting any comparative method in cross-cultural psychology.

1. Behaviours or aspects of behaviour to be compared must be functionally equivalent, i.e. must occur under the same circumstances even if the actual behaviours may not be similar in the different cultures.
2. The behaviours or aspects of the behaviours must be describable first, in terms and categories that are relevant indigenously, and then within a generic framework.
3. Only then, instruments for measuring the behaviour cross-culturally can be developed recognizing however that these instruments must have the same meaning to the different cultures to which they are applied.

In order to explain the achievement of functional and conceptual equivalence, the "emic-etic" concept was adapted (from Pike 1966) as a vehicle. This concept is by now very widely used and its explanation can be found in many published papers. For example Triandis (1974) and Triandis, Malpass, and Davidson (1973) described the concept as follows:

> The emic approach attempts to obtain the best possible description of a phenomenon occurring in a particular culture, utilizing concepts employed only in that culture. It is the most accurate description of the phenomenon. However, emic data cannot be compared across cultures, because by definition the concepts developed in a single culture may not be universal. The etic approach studies a phenomenon by utilizing universal concepts. Such concepts are often approximations of emic concepts, but being universal they are suitable for comparative work. A major problem with much cross-cultural psychological work is that it utilizes a pseudoetic approach, i.e. emic measures (usually made in the U.S.A.) are assumed to be etic (i.e. universal)... (p. 357, 1973; p. 28, 1974).

The treatment of this concept could be paraphrased as follows:

1. Modify imposed etic (the foreigner's viewpoint) to match emic (the subject's viewpoint).

2a. Extract differences between indigenous emic and researcher's emic or etic.

2b. Extract commonalities between indigenous emic and researcher's emic or etic.

3. The commonalities are reformulated as a derived etic which is common to the two cultures in question. We may then enter a new culture and start the process all over again. Thereby an etic which is common across many cultures can be developed.

The ethnographic-experimental approach proposed by Cole et al. (1971) could be summed up as follows. The psychological processes people develop are very much a function of their early experience. Different societies, however, develop different adaptive skills. Now, since people tend to develop greater competence in those skills that they experience most frequently, different cultures will necessarily show deviations from each other in their expressions of competence. As such, the authors explained, "We ... make ethnographic analysis prior to experimentation in order to identify the kinds of activities that people often engage in and hence ought to be skillful at dealing with" (p. 217).

Brislin et al. (1975) did not seem to agree with this strategy and recommended instead that if the intention of Cole (1975) was to assist his subjects in making a connection between the laboratory task and its structural counterpart in the culture, then the research should have been designed specifically to find out why this congruence was not recognized by the subject (p. 23). These approaches discussed above have been two independent and major attempts at delineating cultural variables more clearly.

Indeed the multi-faceted nature of cross-cultural variables has been observed in a number of studies (Frigda and Jahoda, 1966; Wober, 1967; Biesheuvel, 1949). Price-Williams (1976) has referred to this characteristic of variables in cross-cultural research, which he noted, worked at different levels of variables simultaneously (p. 580). Price-Williams' contrast between the "molar" and the "molecular" characteristics of cross-cultural variables did not seem mandatory for a clearer view of the specific variables interplaying in cross-cultural research situations. Berry's (1969a) idea, however, of a functional and conceptual understanding of cross-cultural variables, which Price-Williams noted, would seem unavoidably appropriate in this discussion. Equally valid also was Price-Williams' reference to the work of Cole and Scribner (1974) as another useful model for investigating cognitive processes.

CHAPTER 6

Review of Research Designs and Procedures in Previous Studies

Like any other area of scientific endeavor, cross-cultural psychology must apply techniques and procedures that will facilitate the comparison of findings from various studies. Fortunately researchers can utilize techniques that are already well known and have legitimacy in many different kinds of research. But quite often the interpretations that are made, based on the results obtained, are misleading and in some cases unwarranted. Frijda and Jahoda (1966) discussed some of the problems that could lead to spurious conclusions. Of importance in this discussion was their reference to sampling procedures in cross-cultural studies. They agreed that representativeness in sampling was difficult to achieve and suggested instead that the selection of comparable samples would probably be the best attainable, no doubt because of the "complexity of the culture-variate situation." Specifically, they felt that comparisons based on only two samples were not very useful since generalization to other groups would be relatively hazardous. Two group comparisons are dichotomous comparisons and dichotomies can reflect extremes of behaviour which are not necessarily representative of other samples.

One way to minimize the restrictive interpretational effects of two group comparison would be to use subcultural groups within the two cultures which were to be compared. Another suggestion was to extend the research to many different cultures with features that are relevant to the initial research. The only way to construe this last suggestion by Frijda and Jahoda as different from the original two group procedure, is to expect such research to suspend interpretations and conclusions until a satisfactory number of cultures have been studied. Otherwise each publication of an unrepresentative study would be utilized by subsequent researchers as conclusive or additional evidence, especially when these "findings" can be sensationalized or when they reinforce previous or current hypotheses of individuals or groups who needed the support. Price-Williams (1975) has also criticized the tendency in cross-cultural psychology to present inconclusive evidence as evidence. It is however difficult to see how any real control can be placed over premature theorizing or unfounded pronouncements in an area of life that promotes freedom of expression and exploration. Other suggestions made by Frijda and Jahoda (1966) include the ideas of Reuming (in Reader, 1963, p. 3) who suggested developing tests which are self explanatory, motivating and relatively non-verbal. The "learning techniques" of test administration which Frijda and Jahoda (1966) described were suggestive of the techniques that mainstream psychology has long applied in pilot studies to ensure that the subject understands the test requirements. In a cross-cultural setting, however, the understanding of subject responsiveness in a pilot study presents no less of a problem than in the actual research. The same problems of equivalence, cultural relevance, and interpersonal communication would be present.

The inclusion of intra-cultural comparisons as an added feature in a cross-cultural study has some merit. This idea was more recently suggested by Cole et al. (1971), as a method of containing the generalizability of conclusions within the culture that it best applies. Finally it was proposed that cross-cultural research should be designed to permit administration in the different cultures by researchers respectively indigenous to each culture involved. That is, each researcher will do the research in the two (or more) cultures represented in the study. This idea has also been repeated by Brislin et al. (1975). It would seem that the late A.F. Berien had set the stage for just this kind of collaborative, cooperative research in 1968. In this regard, however, it would be important for cross-cultural psychologists to distinguish very clearly between cooperation and tutelage when they encounter colleagues with less experience, power, and money than they do, otherwise the methodological questions would simply have changed the level at which they confound the study - that is, from the subject-researcher level to the researcher-researcher level.

Sample matching and single sample issues are not the only concerns in cross-cultural research methodology. Price-Williams (1975) has referred to the need for "a massive multifactorial design to be extended, not necessarily to a simple project, but to the entire field in a systematic program over a period of years" (p. 42). So far, he pointed out, cross-cultural research has usually involved "a simple bivariate research design" (p. 42). Campbell (1964) concluded on the basis of an applied epistemological approach to cross-cultural data from visual illusion tests that "Discrepancy can be noted and interpreted only against the background of an overwhelming proportion of nondiscrepant fit, agreement, or pattern of repetition" (p. 327). This would seem to reinforce Price-Williams' (1975) call for more instances of a cultural factor or factors within a well coordinated design which will produce patterns of similarity or differences. It is against such a background that discrepancy can be properly identified. It would be useful to note the cautionary comment by Campbell (1964) in suggesting a multi-ethnographer and multi-target design (that is within a multi-culture design) as a means of removing experimenter bias stemming from the experimenter's own cultural background. It was noted earlier in our discussion that the standard use of ethnographic analysis in cross-cultural research would produce the need for authentication of ethnographic data. Campbell's suggestion would seem to present a workable context for cross-checking ethnographic data. It is important to have a proper understanding of the habits and life style of people being studied in order to make valid interpretations of research data. In other words, it is important to understand what differences mean, within the context of adequate ethnographic knowledge.

Triandis, Malpas and Davidson (1973) have made suggestions about obtaining sample comparability in cross-cultural studies. These writers firstly suggested that after following exactly the same procedures of test development in each of the cultures being studied, results which indicate "similar patterns of correlation" but different mean scores would suggest that the groups are different. Secondly, if by introducing certain experimental manipulations in each culture the groups behave similarly, the conclusion would be reached that the performance of the groups is equivalent and therefore interpretable in the same terms (p. 357). However, a researcher with these intentions must have a proper knowledge of the groups in the first instance to be able to detect unexpected correlations, and in the second instance to be able to match the manipulable variables correctly in the cultures involved. In both instances of similar correlations and similar reaction to experimental manipulation, proper ethnographic analysis or valid emic information might indicate reasons for the similarities and differences. However, the basic point being made by Triandis et al. would seem to be that when tests are constructed under identical conditions and show a similar pattern of correlation they would be considered to have equal validity within the different settings. In other words, the subjects in the two different settings would respectively be responding to two stimuli which have identical or similar characteristics. As such, when these subjects respond differently (as differences in mean scores would show) they would be deemed different on the basis of their deviation from a similar (at least comparable) criterion. This would mean that the tests, by virtue of an identical process of construction and their similarity on a linear scale adequately reflect an objective criterion that has the same ability to identify performance skills that are similar or different in the different settings..

It would appear from this analysis of the suggestion by Triandis et al. (1973) that no distinction was attempted between performance skills and the underlying processes that the responses (i.e. the scores) reflect. This kind of equation (raw scores equal process) whenever utilized would necessarily be fraught with problems. As Buss and Royce (1975) indicated, unless certain confounding effects have been adequately controlled, a test, for example one intended to measure numerical calculations would not necessarily be evoking the use of only numerical ability. A student might, under certain conditions, utilize deductive or inductive reasoning, verbal comprehension, verbal fluency, in addition to attitudinal factors that might influence his performance on the test. It would seem reasonable to expect that some of the so-called extraneous factors contributing to variance could actually be an integral part of the ability sought after (such as deduction). However, the problem remains that these cannot be identified in the raw score. The argument would seem inevitably to lead to the position that scores have to be treated in special ways to produce information about ability, regardless of how rigorous the test construction had been. Without applying the proper procedures the scores obtained from tests (purporting to measure abilities) would merely reflect a pattern of responsiveness, that is, performance skills, which are not necessarily generalizable to other situations in which a similar pattern may be observed. The pitfall here would be, as discussed earlier in the context of emic-etic descriptions of behaviours, that behaviours could be identical but processes underlying them are different and again, behaviours could be different, but the processes or abilities underlying them could be similar or identical. Buss and Royce (1975) attempted to explicate this same issue. The question asked was: "What are cross-cultural commonalities and cross-cultural differences with regard to certain psychological phenomena?" (p. 128). In response they proposed three procedures for identifying similarities and differences in cross-cultural abilities, based on quantitative measures. The following are the procedures.

1. Apply methods which will yield an index of factor similarity.
2. Examine correlations among factors in groups of subjects, each having received the same set of tests.
3. Factors which show invariance are comparably cross-culturally and those showing variance are culture specific.

Buss and Royce (1975) cautioned in view of Irvine's (1969) discussion that "only when it has been demonstrated that the tests measure the same abilities it is permissible to make group comparisons in terms of mean scores" (p. 130). This appeared to be essentially the point Triandis et al. (1973) were presenting in connection with Campbell's (1964) assertion. Campbell's point had been that mean differences obtained through non indigenous tests would be essentially uninterpretable unless their similarity had first been demonstrated. The shortcoming of the point made by Triandis et al. would seem to be its negligence in not specifying adequate procedures necessary to establish substantial similarity. Triandis et al. seemed to have left the impression that simple correlation was enough to demonstrate, in effect, cross-cultural predictive validity. Buss and Royce's (1975) formulation appeared more convincing. They described methods which could be utilized in establishing that factorial similarity was equivalent to ability commonality. They suggested a modification of Tucker's (1958) "interbattery factor analysis" to evolve an intergroup factor analysis. In short their method required a variant of the Q-technique which compared types of individuals rather than types of tests (R-technique.) By administering a larger number of tests to fewer persons, it would be possible to factor individuals rather than tests "in order to determine how individuals should be grouped" (p. 133). Interpretation of the factor loadings on individuals would be arrived at by an examination of the scores on the original variables. The proposal was schematically presented as follows:

INDIVIDUALS

		GROUP I	GROUP II
		1................N_1	1................N_2
INDIVIDUALS	GROUP I 1......N_1	$R_{N_1N_1}$	$R_{N_1N_2}$
	GROUP II 1......N_2	$R_{N_2N_1}$	$R_{N_2N_2}$

To obtain factors common to groups one and two, one should factor matrix ${}^{R}N_1N_2$ (or ${}^{R}N_2N_1$). By respectively factoring ${}^{R}N_2N_1$ and ${}^{R}N_2N_2$ one would obtain factors unique to groups 1 and 2 respectively. Thus beyond establishing functional and conceptual equivalence prior to the research, and beyond the resolution of emic and etic attitudes, behaviours and language, there lies a need for the identification of emic and etic abilities. Within the framework of intergroup factor analysis, Buss and Royce suggested that etic abilities would be reflected in the RN_1N_2 matrix, whereas matrix RN_1N_1 and RN_2N_2 would reflect emic abilities.

One of the requirements of the Q-technique as indicated by Buss and Royce is that more tests than subjects are needed "in order to achieve factors of some stability" (p. 134). This prerequisite would appear to raise some problems. On the one hand, any sizeable sample of individuals would require a prohibitive number of tests. People unlike tests change from one administration to the next being affected by psychological and physiological factors. Because tests are relatively stable over time, those essential aspects of them that maintain predictiveness would not be expected to change. Internal and external factors of change which influence poeple would greatly reduce their predictiveness at different times and places. In the final analysis, it would be more difficult to control for confounding variables where a large number of tests is involved, and if the persons rather than the tests are used as stable reference points. On the other hand, the Q-technique would basically seem to permit a more thorough extraction of factors than the R-technique, because it utilizes a more direct approach. Correlating tests across persons (R-technique) would appear to be an indirect way of determining how people behave; whereas correlating people across tests (Q-technique) would seem a direct way of determining how people behave. Essentially then, as there are definite merits in both techniques, it would seem to be a question of which technique is potentially more capable of controlling for the greatest number and the different kinds of sources of variance in a cross-cultural study. However, Vernon's (1969) comment is of considerable import when he cautioned that factor analysis was merely a formal method of classifying and interpreting performance and should not be considered an infallible method of defining human abilities (p. 22).

Sources of variance are sometimes not easily detectable in cross-cultural studies. This fact would appear to be one explanation behind Strodtbeck's (1964) criticism of the hypothetico-deductive reasoning ascribed to the scientific process. Strodtbeck had felt that failure to examine the alternative hypothesis limited the generative ability of the research. The same trend of thinking appeared to be present in the suggestion of Brislin, Lonner and Thorndike (1973). Summarizing their chapter on factor analysis and what researchers should plan for in cross-cultural research, they wrote:

> A major conclusion: if the researcher is comparing factors between cultures, he should anticipate the possibility of interpreting the meaning of both similar and different factors. He should realize that the factors can be based in instrumentation, rotation techniques, actual content and so forth (p. 287).

Both Strodtbeck (1964) and Brislin et al. (1973) appear to be making a plea for thoroughly examining all possible alternatives so as to eliminate interpretations of the data that are artifactually presented. Brislin et al. (1973) also presented other methods of ensuring proper understanding of cross-cultural variables and their relationships. For example they described multivariate techniques which have predictive ability rather than descriptive ability as do factor analytic techniques (Chapter 12). A brief account of these and other methods can be found also in Eckensberger (1973). An inventory of techniques has been presented by Triandis et al. (1973). These authors provided references to the kinds of methods that have been suggested to improve data comparability and interpretability in cross-cultural studies (e.g. componential analysis, Foster, 1968; Goodenough, 1956; Facet analysis, Foa, 1965; Guttman, 1959; feature analysis, Osgood, 1970 and factor analysis, Osgood, 1965). Problems associated with the application of factor analysis in cross-cultural studies have also been discussed by Irvine (1969) and Brislin et al. (1973). From this background the writer did not share the confidence with which Triandis et al. (1973) predicted that factors would group themselves unequivocably as emic and etic factors. They said:

> Gordon & Kikuchi (1966) emphasize the importance of etic measurement in the development of personality tests. They also point out that checks of relevance, acceptability of test items, meaningfulness of the test format and directions, and differential susceptibility to response sets should be performed on the items to be scaled in each culture before undertaking the major task of scale standardization. They also point to the need to examine the item factorial structure in each culture. Werner & Campbell (1970) correctly point out that the item pool should be developed in both directions; Berrien (1968) agrees, but Gordon (1968), in his reply to Berrien, is unduly concerned about the presence of items which are culture specific. If these items are emic they will form their own factors; if they are etic they will form etic factors and increase the reliability of the measurement of these factors (p. 358).

Of course the expectation, always, is that such a clear presentation of factors will be encountered in a factor analytic treatment of data. The way emic and etic variables are supposed to correlate was presented by Brislin (1973). He suggested that the test instrument (in this case a questionnaire) should be designed so as to include expectations (in this case, items) that are culture-specific (that is, they reflect the emics of each culture involved). When this is the case the emic elements in both cultures will not be expected to show a relationship, whereas the core or etic aspects (aspects common to both cultures) should present an interpretable statistical relationship. However, needless to state, relationships are not always interpretable (and often interpretations are forced upon data which appear to follow an expected pattern); and in addition relationships do not always appear where they are expected.

Spurious relationships are sometimes inadvertently accorded legitimacy, in many cases where the scope of the study is too limited from a design standpoint to yield such conclusions. Many more examples of a relationship are necessary (through replications and experimental manipulations) in order to arrive at a conclusion that certain relationships are culturally representative (Price-Williams, 1975). Even more important, a causal relationship requires extensive data which present as many different plausible explanations as possible. In that way a preferred explanation could be demonstrated as having greater statistical plausibility than other alternative explanations (Malpass, 1977). In discussing ways of achieving more satisfactory conclusiveness in cross-cultural studies Malpass (1977) had diagnosed part of the problem as being traceable to the fact that cross-cultural comparisons were basically static group comparisons. As such apart from enhancing plausible explanations by maximizing their statistical power, Malpass also suggested the investigation of patterns of performance as proposed by Cole, Gay, Glick and Sharp (1971). The causal influences on a pattern would be expected to be much fewer than those influencing any single performance. For example, rival explanations such as fear of the examiner, poor eyesight could threaten the explanation that two groups are different with respect to their performance in, say, the recognition of patterns of dots. Such explanations would be unnecessary (together with the usual experimental variations to test them) if more performances had been observed which showed a pattern in the adequacy or inadequacy of their reports of the dots identified under the same experimental circumstances "between groups and across cultures" (p. 24). Finally Malpass (1977) suggested that investigating the pattern of relationships among variables could yield explanations that are less vulnerable to other alternative explanations than would a simple comparison of mean differences among variables. These suggestions must, according to Malpass (1977), be predicted by "the articulation of theory in the immediate area of research and on gaining support for one's favourite hypothesis in competition with alternative theories of the phenomenon being studied... otherwise they (cross-cultural findings) don't fit anywhere. They must be findings, but they may not be knowledge" (p. 1071). Malpass' argument is reminiscent of the debatable, though frequently accepted, conclusion that a finding which fits into conventional theorizing is necessarily valid as knowledge. If theory testing is one of the goals of cross-cultural research then disconfirmation of theory is no less powerful when obtained cross-culturally than when obtained within the context that the theory was established. In other words given comparability of properly controlled experimental conditions including the functional and conceptual equivalence of the dependent and independent variables, a "new" finding in a cross-cultural study is equally as potent in describing human behaviour as is a unicultural finding. As such unicultural findings outside conventional theories should be equally indicative of modification to the original conventional theory as well as of the formulation of new theory that had no previous support. The precedence (and perhaps even sacrosanctity) that is accorded the current thinking (among researchers in main-stream psychology for example) can indeed be violated by chauvinism and ethocentrism. As such, psychological theory is not infallible and the knowledge derived therefrom is not always objective. The call for cross-cultural psychology to justify its respectability by main-stream psychological standards seem to underestimate the potential of cross-cultural psychology in theory generation. Nevertheless, it is true that there are procedures and approaches outside cross-cultural psychology which could prove useful in resolving some of cross-cultural psychology's methodological problems. Malpass (1977) noted the contribution of anthropology as exemplified in the work of Cole et al. (1971), Scribner (1974), Cole and Scribner (1974). Other potential sources of contributions were described in Malpass' (1977) discussions of attributes of or effects upon responses that are not logically or explicitly derivable in a cross-cultural setting, through previously articulated theory. For example, aspects of the mind of the subject may be hidden from the investigator include crucial factors affecting response decision, many of which would be emically determined. Utility or instrumentality theories were suggested as potentially useful in dealing with such emic factors. A mathematical formulation was presented which considered that the intention to perform a behaviour (BI) materialized on the basis of (1) the attitude toward performing the behaviour (A act), (2) the belief that the referent group or a significant other person thinks one should perform the behaviour (NB), (3) the motivation to conform with the referent group or significant person (MC) and (4) the performer's perceived moral obligation to perform the behaviour (NB_p). The algebraic equation was as follows.

$$BI = (A_{act})W_1' + (\sum_{i=1}^{n} NB_1 - MC_1)\ W_2 + (NBp)W_3,$$ where

W1 W2 W3 were expected to be regression weights derived empiracally and indicating the relative importance of each related component in predicting the occurrence of the intended behaviour (BI). A first reaction to this formula, which was used in assessing family-planning intentions among Mexicans and U.S. samples, would be against its apparent ignoring of certain physiologically mediated conditions which would influence the intention to perform a behaviour. For example, application of this model, as presented by Malpass (1977) could produce misleading results in the case of the intention to get married where the subject was homosexual or impotent. Once again, in order to ensure the efficacy of the research tool being suggested a thorough knowledge of those conditions in subjective culture which mediate behaviour has to be assumed. This requirement is further encountered in the recommended procedures for deriving the various components of the equation. These procedures involved the researcher's dependence on the subject and local sources for crucial information. It would appear in effect, that the equation's predictive efficacy largely depended on the validity and pertinence of the elicited responses as well as the researcher's knowledge and perceptiveness in assessing which information should be sought or included. However, to the extent that the researcher was knowledgeable about the possible sources of influence on a person's intention to perform a behaviour, one would agree that the equation was precise and enhanced the measureability of certain cross-cultural behaviours. Indeed, as Malpass (1977) conceded not all such influences can be known. But whereever indicated existing theory and techniques from outside cross-cultural psychology could be utilized to describe and quantify testable elements of behaviour. A methodical application of approaches that could help overcome certain problems which currently obstruct methodological integrity in cross-cultural studies, would involve:

1. The formalization and operationalization of abstract theory at the level of applied research.
2. Development of specific operational procedures for obtaining and categorizing (especially emic) responses or categories.
3. Application of these procedures.
4. Validation of the results derived through the application of operational procedures.

Quite clearly Malpass has enumerated some very important requirements in cross-cultural psychology. The contribution that the broader field of psychology could make to maximizing the sensitivity of cross-cultural research has indeed been under-appreciated. However, equally so, the contribution that cross-cultural psychology can make to theory optimization in main-stream psychology has apparently been unrealized.

Conclusion

In the final analysis, then, the obtaining and interpretation of valid information is not guaranteed unless the cross-cultural researcher's knowledge of his tools and subjects is intimate. Analogically, the methodological credibility of cross-cultural psychology relies on a symbiotic and mutually respectable relationship with mainstream psychology and other disciplines engaged in the same transactions of explaining human behaviour. The goal of all research is objective knowledge. Methodology could only assist to the extent that the various aspects of its validity are recognized and understood. The upshot of this discussion is, then, that in addition to methodological rectitude (whether borrowed or created) the mind of the subject is a central concern in any investigation involving people. The cross-cultural psychologist's task therefore is to assure himself and his readers that he obtained valid information reflecting real behaviours rather than refracted versions or artificial effects.

In retrospect, a review of the literature has been attempted in order to selectively integrate the many different facets in cross-cultural research and methodology. Above all, it brings into focus issues of serious import that have not been "aired" sufficiently. Because the field of cross-cultural psychology is extremely diversified, research characterizations of its unique or common features still remain unsystematized. Therefore an integration of different lines of research and conceptualizations within delimiting themes was considered to be a practical format in presenting a Review of the Literature in this area.

However, the Review was essentially intended to present certain main ideas, conclusions and suggestions which should be implicit or explicit considerations in any research study involving a non-indigenous culture. Indeed, the problems and issues discussed in the Review will be encountered in most cross-cultural research. In effect, this Review of Literature will set the stage for the utilization of specific ideas or findings in the present study.

Notwithstanding the errors and omissions of past and present researchers, their efforts have laid the groundwork for a sincere and humanitarian understanding of mainly non-white cultures. Indeed mankind must acknowledge and eulogize these pioneers and their followers for their sensitivity, tolerance and respect for the differences in different species of man.

As we are all fallible, this writer is conscious of his own propensities. Thus, while presenting a kaleidoscope of methodological issues, this Review will nevertheless serve as a cathartic introduction to a study which must itself have many caveats!

Finally, however, as this chapter was not intended to specifically present a review of literature in memory and reasoning, the next section will briefly and selectively discuss relevant information on these two specific areas of research in cross-cultural psychology.

CHAPTER 7

The Cross-Cultural Study of Memory and Reasoning and the Objectives of the Present Study

The previous chapters in this section of the thesis have discussed various areas in cross-cultural research in which inadequate methodologies and consequently invalid interpretations of data jeopardized scientific objectivity. A broad sweep of cross-cultural research was undertaken which called attention to the many complexities involved in the field of cross-cultural research. When a researcher undertakes to do cross-cultural studies without an awareness of these issues previously described, his efforts are likely to contribute to valid knowledge only through inadvertence. He is more likely to arrive at misleading interpretations which multiply confusion and misinformation about alien cultures.

In approaching the previous chapters as an analytic exposition, the present author surveyed a wider area of the literature than the objectives of the present empirical study required. The major purpose of this thesis however is to study memory and reasoning in a cross-cultural context. Cross-cultural study of memory and reasoning had been encountered in studies discussed previously, usually under topics dealing with cognition (Berry and Dasen, 1974); thinking

(Cole et al., 1971; Cole and Scribner, 1974) adaption (Berry, 1976; Cronbach and Drenth, 1972) and various aspects of memory (Cole and Scribner, 1977, Meacham, 1975; Kagan and Klein, 1973; Cole et al., 1971). Some studies have given emphasis to either memory or reasoning ability within a research design dealing, for example, with perceptual abilities (Dawson, 1967; Wober, 1967) and logic (Luria, 1971, 1976).

These studies in cross-cultural psychology have been recently discussed by the Laboratory of Comparative Human Cognition (1979) as involving one or more of the following theoretical approaches.

1. Cognitive Universals - Theories which attempt to delineate invariant cognitive stages or pattern of relationships that are hypothesized as occurring universally.
2. Socialization Theories - Theories based on the assumption that the differences and similarities in human beings can be traced to the special (cognitive) methods they have developed to cope with or control the impact of the physical environment on their survival.
3. "Mixed" Approaches - Theories which have frequently been applied in the area of culture and memory seeking to differentiate

between universal processes and culture-specific processes.

4. Ethnographic Psychology - This approach took off from observations that the poor performance of non-Western groups (specifically the Kpelle of Liberia) in laboratory-constructed, cognitive, test situations did not reflect the competence these subjects demonstrated in natural settings involving similar cognitive skills. The theory is an attempt to explore "the relationship between culturally organized activities and the development of systems of cognitive skills..." (Laboratory of Comparative Human Cognition, 1979, p. 164). The major difference between this theory and the three others previously mentioned is its use of the experimental situation, rather than the test, as the basic tool of psychological analysis.

The importance of the above analysis in terms of theoretical positions is that it summarized cross-cultural research from a non-methodological standpoint. The latter has been the popular approach in this field. For the present writer, the value of the Laboratory's discussion is that it provides alternative theories from which to understand the objectives of various cross-cultural studies. One of these theories, the "mixed" approach, clearly identifies the theoretical position of the present study. That is, the empirical study to be reported attempts to differentiate universal skills from culture-specific ones within the same design.

Despite the "high profile" given to the enthnographic approach in the previous chapters its utility in the empirical study reported in the thesis was more indirect than direct. That is the researcher, being relatively bicultural, utilized his understanding of the two cultures in choosing or devising conceptually and functionally similar memory and reasoning tasks which have sound ethnographic bases in both cultures.

There are other ways in which previous research in cross-cultural contexts have influenced the empirical study in this thesis. For example, one of the main topics of cross-cultural investigations has been described by Triandis et al. (1973, p. 360) as 'Person's Abilities', that is, research involving cognitive skills. It is in this area, in this writer's opinion, and judging from the studies cited in this section, that much of the misunderstanding about abilities encountered cross-culturally can be found. It therefore seemed appropriate that memory and reasoning abilities, two areas in cognitive functioning that have been recently shown (Cole et al., 1971) to be misunderstood, should be made the focus of this study.

Since memory and reasoning abilities have often been associated with intellectual and cultural bases, it seemed appropriate that this study should explore the effect of cultural influences as well as intellectual influences within a cross-cultural framework. The major purposes of the study were therefore forumlated with a view of exploring, within a "fixed" empirical design, some general and specific issues as delineated below.

Major Purposes

In general, the study is an investigation of memory and reasoning abilities in Sierra Leone and Canada. Review of past research given in the previous chapters (ch. 2 - 6) prompted the author to design a study to answer some general and specific questions. The general questions are:

1. Are there cultural differences in memory abilities: If there are, can they be attributed to the type of modality specifically involved in receiving the information?
2. Are there cultural differences in reasoning ability? If there are would the differences be evident for both non-verbal and verbal logical problems?

3. What is the role of a specific processing ability, such as successive and simultaneous synthesis, in memory and reasoning abilities across cultures?

As indicated in Chapter 1 (p. 4, 5), the specific questions are:

1. Was Dawson's (1967) study aimed at the "wrong" modality for the Sierra Leoneans, that is the visual modality?
2. Was Wober (1967) correct in assuming a different "sensotype" between Western and non-Western groups, as exemplified in Sierra Leone and Canada?
3. Will the principle of "functional entailment," as discussed by Cole et al. (1971), be confirmed in Sierra Leone; and will Canadians utilize the generic principle in generating groups of familiar physical objects, as discussed in the same study?
4. Will cultural differences be seen in the way children approach verbal logical problems such as syllogisms and will this difference involve the influence of social-cultural experiences as was discussed by Luria (1971)?

5. Does either high or low successive and simultaneous synthesis enhance performance in specific memory and reasoning tasks; and does the method of presentation determine the method of processing?

Design of the study is presented in the next Chapter.

PART II

METHOD AND PROCEDURES

CHAPTER 8

Method

Subjects

In order of more clearly determine patterns of reasoning and memory which were primarily due to cultural factors as opposed to purely intellectual factors, two cultures were investigated using samples that were matched on age, sex and grade (i.e. years of schooling).

The two cultures represented in the study were Sierra Leonean and Canadian.

In each culture, the Coloured Progressive Matrices (Raven, 1963) were used to match the groups. Subjects who according to the test manual (Raven, 1963) performed at the 75th percentile and above were included in the higher IQ group and those who performed at the 25th percentile and below included in the lower IQ group. The subjects in each culture were boys ranging from age 9 to 11 years, who had had four to six years of schooling (roughly, grades four to six). The Canadian samples were from different schools in Edmonton, the capital of Alberta, one of the ten Provinces of Canada. The Sierra Leonean samples were from Freetown, the state capital of the Republic of Sierra Leone. In this case, too, the boys were obtained from different schools. Also, in both countries various levels of socio-economic status were represented in the samples.

The boys from Sierra Leone represent a wide range of the local cultural scene. That is they belong to different linguistic groups which originally hailed from different parts of the country. They and their parents now settle in Freetown, the capital city and speak a lingua franca, Krio.

From this brief description it would be clear that the group of boys used in this study are relatively heterogeneous in their social and sub-cultural background. However they share the same geographical and historical "roots" associated with the cultural life of Sierra Leone.

The boys from Canada similarly represent a wide range of the cultural scene in Canada. Canada's population includes immigrants from various parts of the world. However the boys in the study and their parents are permanently resident in Edmonton. The Canadian sample, then, as is the case with the Sierra Leone sample, is, therefore, relatively culturally heterogeneous in the sense that the original cultural backgrounds of the children were different. However in this case they have come to share a common Canadian heritage and, as Canadians, are considered culturally similar. The total numbers of boys from Freetown and Edmonton respectively are given in Figure 1.

The life-style and cultural milieu in Sierra Leone and Canada are very different. The two countries are different in terms of their level of technological development. Sierra Leone is less industrialized and less urbanized than Canada. For example most families do not own cars, and computer technology has yet to become fashionable in Sierra Leone, whereas most families in Canada have at least one car and very few things are done in Canada without the help of computers. Both medical and educational management are less efficient in Sierra Leone than in Canada.

The countries also differ in respect of their traditional values. Interpersonal relationships appear to play a much more serious role in Sierra Leone than in Canada. For example several homes in Sierra Leone do not have fences, and in many cases where there are fences gaps are deliberately left in ~~the~~ fences to permit free movement of neighbours into each others **yards** and for passersby looking for short cuts that the roadways do not permit. In Canada however it is unheard of for a pedestrian to walk through a private yard as a short cut to another part of the neighbourhood. Friendships and family relationships are taken much more seriously in Sierra Leone than in Canada. Food, money and gifts are exchanged in these relationships without embarrassment, and in some cases with open expection, as a sign of solidarity, caring or gratitude.

Finally Sierra Leone would be considered a non-western country whereas Canada would be classified as a western country.

Figure 1. Groups Represented in the Study.

Culture	High IQ	Low IQ
Sierra Leone	N = 48	N = 57
Canada	N = 60	N = 42

IQ

Tasks

The following tasks were used in the study:

Reasoning Tasks

1. Syllogisms
2.i Categorical sorting
2.ii Constrained sorting

Memory Tasks

1. Modality Short Term Memory (non-verbal)
1.i Visual (successive and simultaneous presentations
1.ii Auditory (successive presentations)
1.iii Tactile (successive and simultaneous presentations)
i.iv Visual/tactile (simultaneous presentations

"Marker" Tasks for Successive and Simultaneous Processing

1. Figure Copying Test
2. Semantic Short Term Memory Test

The Ravens Coloured Progressive Matrices (used only to create the IQ groups), the Figure Copying Test, Semantic Short Term Memory have been used in many studies before this and are adequately described elsewhere (e.g. Orn and Das, 1972, Das, 1972, Das, 1973, Jensen and Rohwer, 1970). The tasks for categorical sorting and similarity mediation (constrained sorting) were used by Cole et al (1971), the syllogisms were developed along lines suggested by Luria (1971), and the modality tasks developed out of a pilot project in connection with another research by Klien (unpublished Masters Thesis, 1973).

1. The Figure Copying Test:

This task was developed by the Gesell Institute (Ilg and Ames, 1964). It consisted of ten geometric designs which were copied by the subject. The design remained in view all the time.

2. Semantic Short Term Memory Task:

This task was originally adapted from Baddley (1966), by Orn and Das (1972). In the latter paper the adapted versions consisted of acoustically similar and semantically similar words. In the present study, 24 four-word lists comprising semantically similar and control words were derived from the same collection used in the Orn and Das study. The presentations consisted of semantically similar lists randomly interspersed with control words. The words in the two categories were as follows:

Semantic: big, long, great, tall, large, wide, high, fat, huge.
Control: cow, day, bar, pen, few hot, key, wall book.

3. Categorical Sorting:

Cole et al. (1971) descrived a sorting task in which subjects had to put objects into specified categories. They were required to give reasons for the inclusion of the objects into the categories chosen for them. A similar task as described by Cole et al. (1971) had been used with subjects from the United States. This task involved the sorting of twenty objects which were familiar to the Kpelle of Liberia and the American subjects respectively. The objects which were randomly presented, represented four categories or classes - - food, clothing, tools, utensils. The same lists of objects which were used with the Kpelle and Americans respectively (Cole et al. 1971, pp. 69 and 75), were used in the present thesis in Sierra Leone and Canada respectively (Table 1).

The objects could be sorted into "conventional" groups. However since "unconventional" groups were possible, the subjects in this study were, as in the study by Cole et al., asked to give justification for the groups they generated.

4. Similarity Mediation (constrained sorting):

Cole et al. (1971) used some items (fifteen of them) from the lists to elicit a different kind of categoriza-

Table 1

Lists of Objects used in Sierra Leone and Canada

List of Objects Used In Sierra Leone	List of Objects Used In Canada
plate	plate
pot	pot
pan	pan
cup	cup
calabash	glass
potato	potato
onion	onion
banana	banana
orange	orange
coconut	lemon
hammer	hammer
knife	knife
file	file
cutlass	saw
hoe	axe
shirt	shirt
hat	hat
trousers	pants
headtie	shoes
signlet	sox

tion from the subjects. This time two objects were presented and the subject was required to choose one from the general group to place between the two objects presented. The subject's choice should be "alike in some way" to the other two. Again justification was given for the choices. The lists given below were used in Sierra Leone and were the same as the once used in Liberia by Cole et al. (1971). The pairs presented to the Canadians were essentially the same as the Sierra Leone list except that coconut, hoe, cutlass and calabash were respectively replaced with lemon, axe, saw and glass. In both cultures the clothes category was not included in the task. This approach was previously followed by Cole et al. (1971). The object pairs used in Sierra Leone are presented in Table 2.

5. Syllogisms:

Luria (1971) had found out that

> ... the operation of reaching a logical conclusion from the syllogism is certainly not of a universal character as one might have thought.... different socio-economic conditions with their corresponding special features of cultural life, create conditions in which the dominant role in cognitive processes is played by personal, practical experience.

These conclusions were reached from the results of experiments by Luria (1971, 1976) using unschooled peasants and people who have one or two years of schooling. Luria's find-

Table 2

Objects Pairs by Category Used in Similarity-Mediation Task in Sierra Leone

Category Pairs	Object Pairs
food-food	onion-orange potato-orange banana-coconut
tool-tool	hoe-cutlass hammer-knife cutlass-hammer
utensil-utensil	pan-cup plate-calabash plate-pot
food-utensil	coconut-calabash orange-cup potato-pot
food-tool	orange-hoe banana-cutlass coconut-hammer
utensil- tool	calabash-file pot-cutlass calabash-hoe

ings led the present writer to hypothesize that if sociohistorical differences within the same culture could produce such dramatic results as Luria found, then influences from different cultures should affect syllogistic reasoning just as markedly. Accordingly twelve syllogisms were included in the present thesis. They represented four different classes of syllogisms. The four classes included syllogisms which reflected experiences in Sierra Leone; syllogisms reflecting experiences in Canada; syllogisms which were culturally irrelevant and realistic and those which were culturally irrelevant and artificial or unrealistic. A sample is presented below. (Complete list in Appendix II)

Items

1. Sugar-cane grows in hot countries. Sierra Leone is a hot country. Does sugar cane grow there?
   (This item is familiar to Sierra Leone)
2. Important people in society look alike. Pierre Trudeau and Bobby Hull do not look alike. Are they important or not?
   (This item is familiar to Canada)
3. All field sports and dangerous. Swimming is not a field sport. Is swimming dangerous or not?
   (This item is culturally irrelevant but realistic)

4. All dogs can fly and all elephants are dogs. Can all elephants fly or not? (This item is culturally irrelevant but unrealistic or artificial)

In the case of each syllogism, an awareness of the logical relationship of the premises would yield a correct solution.

6. Modality Tasks:

These tasks were primarily inspired by Klien (unpublished Masters Thesis, 1973) who used them to investigate cross-modal transfer in deaf and hearing children. Originally Birch and Belmont (1964) had employed the technique of cross-modal comparison among normal and retarded readers. These previous attempts were modified and extended to serve the special purposes of this study.

The modality tasks included visual, auditory and tactile presentations. These presentations were made successively or simultaneously. The basic patterns were as follows:

Pattern 1	O X O X O
Pattern 2	O X X O O
Pattern 3	O O X X O

Visual Presentations

Each successively presented pattern was a timed sequence of light flashes which produced any one of the patterns illustrated above. Each flash was of 2 second duration and "gaps" between flashes were counted by 2 second intervals (marked X above). Each O represented a light flash. A simultaneously presented pattern consisted of continuous light for 2 seconds from three of the light bulbs at the same time, corresponding to any one of the three patterns indicated in the illustration.

A presentation consisted of any two patterns of successively or simultaneously presented light flashes.

Auditory Presentations

The same patterns were presented as pure tone sounds or "beeps" from a tape recorder. Only successive presentations were made. A presentation consisted of any two patterns.

Tactile Presentations

These involved the same patterns as previously described and were delivered by an apparatus as painless jabs to the palms of both hands. The tactile apparatus (as in the case of the visual apparatus) was an electronically controlled gadget with five flat headed, metal cylindrical "pegs" in a straight line. Each "peg" was about half an inch in diameter. The subject placed his hands, palms down, over the top of the apparatus. The unactivated "pegs" were flush with the top surface. When a pattern was activated the pegs were pushed up in sequence to hit the palm of the hand. Each jab lasted two seconds. A simultaneous pattern consisted of three jabs delivered simultaneously for two seconds in any of the patterns. A diagram of each apparatus is included as Appendix III. Six successive presentations were made in each modality (visual, auditory, tactile) and six were simultaneously presented in each modality (except auditory). A cross-modal (visual-tactile) was included as a final simultaneous presentation. The order of presentation is in Appendix III.

Procedures

The students were tested by the writer in their respective school settings in both Canada and Sierra Leone. Contact was made with the school principal who arranged for the present writer to select the students from the classes which fell within the age range previously indicated. The students as a group were addressed by the writer who acquainted them with the general nature of the study. No indication was given of the cross-cultural nature of the study, but the students were told they would be informed at the end of the research how well they did as a group.

In each country the Coloured Progressive Matrices (Raven, 1963) were administered as a group test. In Canada the students who fell into the low IQ range were obtained almost exclusively from classes for the educable mentally retarded. The smaller numbers (about six to eight) in these classes made it possible to individualize the explanations and instructions. The subjects in the low IQ group in Sierra Leone were selected after the test had been given. Because numbers in these "integrated" classes were large (25-35) the writer enlisted the help of two other teachers to ensure that the instructions were understood. In both countries the writer moved along the rows of desks to check on the progress of the students as they proceeded with the Progressive Matrices. The high and low IQ groups were based on the norms provided in the Manual of the Progressive Matrices (Raven, 1963). A discussion of the use of the Progressive Matrices in this study is given in Appendix I.

The other tests were administered individually to the subjects by the writer. By this time the subjects had come to know the examiner quite well and freely asked questions about the nature of the tests that were about to be administered.

It took approximately four months of almost daily visits at the various schools to complete the testing in each country.

At the end of the testing, students were told how well they had done, since several of them insisted on knowing this.

With the exception of the categorization analysis, all the computer programs used in the analysis were standard and did not need modification. It was necessary in the case of the Categorization Task to develop a special program which would provide an index of the degree of match between examiner expected categories (that is the conventional groups) and the subject generated categories. All the tasks and their sub-sections were first subjected to 2 (cultures) by 2 (IQ levels) analysis of variance. As a second exploratory step, certain tests which will be discussed were subjected to factor analysis.

PART III

RESULTS AND DISCUSSION

CHAPTER 9

Modality Mediated Tasks

Interest in modality-mediated performance can be traced far back to the Torres Straits expedition very early in this century undertaken by Rivers (1901, 1905). However more recent investigations have been conducted which have not examined the perceptual modalities by using geometric illusions as did many earlier investigations. For example Goodnow (1976) discussed a number of studies about the acquisition of information through various modalities. Some of Goodnow's conclusions based either on a review of the literature or on her own investigations seemed to support the motives and in some cases the findings of the present research.

Goodnow noted that the modalities were separate and important. The assumption that there was a hierarchical order in the modalities was substantiated, in the view of that writer, by the fact that subjects tended to find cross-modal tasks more difficult than intra-modal tasks. However it would seem that even within the same modality, differences in performance will arise because of subjects' tendency to inspect different aspects of the same input material. Also subjects may be using different forms of information processing for different kinds of input material. In any case Goodnow seemed to conclude that "the critical variable is not the modality per se but the degree of experience in working with a modality" (p. 14). So then it would appear that poor performance may be observed in cross-cultural studies because of tasks which require skills that are "neither practised nor valued by the culture" (p. 17).

Much closer to the cultural setting and methodology of the present study, were the experiments described by Cole and Glick (1968) involving information through the visual modality. Their study which compared West African with North American subjects, focussed on the accuracy with which subjects recalled the number of dots presented in a random pattern or an ordered pattern. This study was an uncomplicated approach to the study of visual perception and information processing. But as the authors cautioned, the questions it raised regarding certain of its fundamental aspects need not be construed as readily answerable. This kind of research however would seem necessary as a first step to investigating cultural differences or similarities than one with more complex stimulus arrays, simultaneously presented to different perceptual modalities. The latter research approach was used by Dawson (1967) in Sierra Leone, who investigated perception from the standpoint of field-dependence and field-independence. The shortcomings of this study's methodology have been discussed earlier. In this section, certain issues related to Dawson's study are raised for re-examination.

As was suggested by Dawson's (1967) study, the Temnes of Sierra Leone proved less efficient in performing certain tests of field-independence because of a less 'global' perceptual style. It was suggested by Witkin (1962) that this kind of deficiency was due to a disability in forming a more analytic perceptual style. "Perception" was apparently sometimes equated with "perceptiveness" in the field-dependence construct. In this regard then Witkin's construct fused two aspects of perception. These appeared to be the socialization and the intellectual aspects of perception. The limitation involved on the one hand is psychological in the sense of a social deviance such as psychosis, and on the other hand the limitation is a psychological one in the sense of being an intellectual weakness such as in poor visual acuity. This synthesis of psychological phenomena made it difficult to determine whether the Temnes were psychologically inflexible or intellectually deficient or both, which made them unable to assess or interprete certain visual percepts as well as did the Mendes in Sierra Leone. The present study chose to examine one area of perceptual ability, that is the ability to receive, store and compare stimuli using three modalities. In this study it was expected that there will be cultural differences in visual, auditory and tactile areas of performance respectively. Also by presenting the items randomly in a simultaneous or successive sequence it was expected that the tests will show whether there was a cultural difference in perceiving perceptual stimuli when presented successively as against simultaneously.

As discussed, Dawson's (1967) study involved an interaction of complex variables whose separation would seem important in order to provide heuristic comments about specific perceptually based abilities. Accordingly our study has attempted to observe specific patterns of cross-cultural differences or similarities in information processing utilizing, a controlled, time-sequenced paradigm. A diagram of the apparatuses used in this aspect of the research will be found in Appendix 111. The tests included in this section have been described in Chapter 8. These were non-verbal, short-term memory tasks presented in three modalities, in successive and simultaneous patterns respectively. The method of presentation was varied in order to explore the effect of method of presentation on successive and simultaneous processing (Das, 1973).

Table 3 presents the means for each IQ level in Sierra Leone and Canada, and Table 4 presents the mean scores according to country and IQ. Tables 5, 6, and 7 respectively present the summaries of the two-way ANOVAS

Table 3

Modality Mediated Tasks: Comparison Between IQ Groups in Each Culture.

Non-Verbal Short Term Memory - Visual, Auditory and Tactile Modalities		Sierra Leone		Canada	
		High IQ	Low IQ	High IQ	Low IQ
Correct responses in three modalities, stimuli presented both successively or simultaneously (all presentations)	M	29.69	25.37	32.85	21.71
	SD	2.98	3.94	2.97	8.76
Patterns presented SUCCESSIVELY (one item at a time) in each set, for all modalities	M	15.08	12.98	16.52	10.50
	SD	2.19	2.31	1.51	4.45
Patterns presented SIMULTANEOUSLY (all together) in each set for all modalities	M	14.60	12.39	16.33	11.05
	SD	1.79	2.49	1.85	4.53

Table 4

Modality Mediated Tasks: Comparison Between Cultures and Between I.Q.'s.

Non-Verbal Short Term Memory - Visual, Auditory and Tactile Modalities		Sierra Leone	Canada	High IQ	Low IQ
Correct responses in three modalities, stimuli presented both successively and simultaneously (all presentations)	M	27.34	28.26	31.44	23.82
	SD	8.13	4.11	3.36	6.65
Patterns presented SUCCESSIVELY (one item at a time) in each set for all modalities	M	13.94	14.04	15.88	11.93
	SD	2.47	4.25	1.97	3.53
Patterns presented SIMULTANEOUSLY (all together) in each set, for all modalities	M	13.40	14.16	15.56	11.82
	SD	2.40	4.12	2.01	3.51

(culture x IQ) for all presentations, successive presentations, and simultaneous presentations.

All Presentations

The results as summarized (Table 5) indicated that there were no significant cultural differences. There were however significant differences for the IQ groups and the interaction. The high IQ performed better than the low IQ group. However, the low IQ group from Canada performed significantly lower than the low IQ group from Sierra Leone, causing the interaction effect.

Successive Presentations

The results indicated no significant differences for culture but the IQ groups and the interaction reached significance levels. The high IQ groups outperformed the low IQ groups. The interaction was caused by the relatively low mean score for the Canadian low IQ group.

In this case as in the case of the successive presentation there were no significant differences attributable to cultural background. The IQ groups and the interaction, however, show significant differences. The significantly low mean score of the low IQ group from Canada was responsible for the interaction effect.

Table 5

Summary of ANOVA for All Presentations in the Visual, Auditory and Tactile Modalities

	Df	MS	F	P
Sierra Leone vs. Canada	1	0.226	0.009	0.923
High IQ vs. Low IQ	1	2960.35	121.259	0.001
Interaction	1	589.27	24.137	0.001
Error	203	24.41		

Table 6

Summary of ANOVA for Successive Presentations

	Df	MS	F	P
Sierra Leone vs. Canada	1	9.35	1.29	0.26
High IQs vs. Low IQs	1	814.91	112.53	0.01
Interaction	1	194.45	26.85	0.01
Error	203	7.24		

Table 7

Summary of ANOVA for Simultaneous Presentations

	Df	MS	F	P
Sierra Leone vs. Canada	1	3.71	0.496	0.482
High IQs vs. Low IQs	1	699.13	93.356	0.001
Interaction	1	119.33	15.934	0.001
Error	203	7.49		

It will be observed that in the overall performance in all three modalities the high IQ groups outperformed the low IQ groups. This was expected since these tasks were short-term exercises involving comparison of remembered patterns of stimuli. It would be readily observed that the mean scores for corresponding cultural groups were quite close. Also, as presented, the overall picture when the groups received the stimuli simultaneously showed no difference between the two cultures.

However a rather complicated picture emerged with regard to culture when the subtests were examined individually. The mean scores are presented in Table 8. Characteristically the high IQ outperformed the low IQ in each of the tasks after the breakdown. This showed once more that the hierarchical relationship between high and low IQ remained the same in each cultural setting. Tables 9 to 14 present summaries of the ANOVAS for each subtest.

Visual-Visual Successive Matching

A further breakdown of the test scores in this section permitted the observation of any significant performance differences in items which utilized only the visual modality and were presented successively. The results of the ANOVA revealed significant differences for culture, IQ, and interaction. The Sierra Leone groups outperformed

Table 8

Modality Mediated Tasks: Performance on the Subtests

Modalities Subtests		Mean Scores and Standard Deviations			
		Sierra Leone (SL)	Canada (CAN)	High (IQ)	Low (IQ)
Visual/Visual Successive	M	5.08	4.90	5.56	4.37
Matching	SD	0.98	1.58	0.73	1.53
Auditory/Auditory Succes-	M	3.95	4.53	4.93	3.48
sive Matching	SD	1.30	1.61	1.27	1.34
Tactile/Tactile Succes-	M	4.87	4.61	5.35	4.07
sive Matching	SD	1.20	1.52	0.89	1.50
Visual/Visual Simul-	M	5.10	5.08	5.72	4.40
taneous Matching	SD	1.14	1.51	0.55	1.59
Tactile/Tactile Simul-	M	4.69	4.90	5.33	4.20
taneous Matching	SD	1.04	1.49	0.91	1.39
Visual/Tactile Simul-	M	3.48	4.18	4.48	3.21
taneous Matching	SD	1.11	1.51	1.15	1.26

Table 9

Summary of ANOVA for Visual-Visual Successive Matching

	Df	MS	F	P
Sierra Leone vs. Canada	1	5.70	4.63	0.03
High IQ vs. Low IQ	1	76.28	61.97	0.01
Interaction	1	30.29	24.61	0.01
Error	203	1.23		

the Canadian groups. Again the low IQ group from Canada produced a significantly low mean score.

Auditory-Auditory Successive Matching

As in the case of the above analysis the present analysis was done to inspect significant differences, if any, when only the auditory modality was involved, and the items were presented successively. The results showed that significant differences were present among the groups in respect of culture, IQ, and interaction. The Canadians outperformed the Sierra Leoneans and the high IQ groups outperformed the low IQ groups. The interaction effect was due to the significantly lower mean score of the Canadian low IQ group (Table 10).

Tactile-Tactile Successive Matching

In the successive presentation affecting only the tactile modality the results indicated significant differences for culture, IQ, and interaction. The Canadian groups were outperformed by the Sierra Leonean groups and the low IQ groups were outperformed by the high IQ. The interaction effect was probably enhanced by the significantly low mean score of the Canadian low IQ group (Table 11).

Table 10

Summary of ANOVA for Auditory-Auditory Successive Matching

	Df	MS	F	P
Seirra Leone vs. Canada	1	7.93	5.08	0.025
High IQ vs. Low IQ	1	97.97	62.76	0.001
Interaction	1	25.3	16.21	0.001
Error	203	1.56		

Table 11

Summary of ANOVA for Tactile-Tactile Successive Matching

	DF	MS	F	P
Sierra Leone vs. Canada	1	9.59	6.92	0.009
High IQ vs. Low IQ	1	90.90	65.61	0.001
Interaction	1	14.30	10.30	0.002
Error	203	1.39		

Table 12

Summary of ANOVA for Visual-Visual Simultaneous Matching

	Df	MS	F	P
Sierra Leone vs. Canada	1	2.08	1.63	0.20
High IQ vs. Low IQ	1	91.80	71.81	0.001
Interaction	1	17.91	14.01	0.001
Error	203	1.28		

Visual-Visual Simultaneous Matching

The items included only simultaneous presentations in the visual modality. The results indicated that the performances of the cultural groups were not significantly different but that the performances of the IQ groups were significantly different. There was also a significant interaction effect. The high IQ performed better than the low IQ groups. The Canadian low IQ group's performance was significantly lower than all the other groups thereby contributing to a significant interaction effect (Table 13).

Tactile-Tactile Simultaneous Matching

These items were presented simultaneously in the tactile modality. The results indicated significant differences in the performance of the IQ groups but there were no significant differences among the cultural groups. Again the high IQ outperformed the low IQ groups. However the significantly low mean score of the Canadian low IQ group contributed to a significant interaction effect (Table 14).

Visual-Tactile Simultaneous Matching

This test was included to provide some idea of the effects of cross-modal presentations on the four groups. The items were presented in the visual mode and comparison was to be made with the items presented in the tactile

Table 13

Summary of ANOVA for Tactile-Tactile Simultaneous Matching

	DF	MS	F	P
Sierra Leone vs. Canada	1	0.24	0.18	0.67
High IQ vs. Low IQ	1	63.93	48.50	0.01
Interaction	1	8.13	6.17	0.01
Error	203	1.32		

Table 14

Summary of ANOVA for Visual-Tactile Simultaneous Matching

	DF	MS	F	P
Sierra Leone vs. Canada	1	9.70	7.25	0.008
High IQ vs. Low IQ	1	74.57	55.80	0.001
Interaction	1	16.50	12.35	0.001
Error	203	1.34		

Table 15

Heirarchical Order of Performance Scores According to Culture

SIERRA LEONE	CANADA
1. Visual-Simultaneous	1. Visual-Simultaneous
2. Visual-Successive	2. Visual-Successive
3. Tactile-Successive	3. Tactile-Simultaneous
4. Tactile-Simultaneous	4. Tactile-Successive
5. Auditory-Successive	5. Auditory-Successive
6. Visual/Tactile Simultaneous	6. Visual/Tactile-Simultaneous

mode. Significant differences in performance were observed in respect of culture, IQ, and interaction. The Canadian groups performed better than the Sierra Leone groups and the high IQ outperformed the low IQ groups. The interaction was due to the significantly low mean score of the Canadian low IQ group.

Relative Efficiencies of the Modalities

An inspection of Table 8 would reveal that the subjects from Sierra Leone proved more accurate in comparing remembered patterns, when the latter was presented to the visual modality in a successive manner as well as when the stimuli were presented to the tactile modality successively. The Canadian samples on the other hand were more accurate when the stimuli were presented successively in an auditory modality as well as when presented simultaneously and cross-modally (visual-tactile). Both groups achieved the same amount of accuracy when the stimuli were presented in the visual and tactile modalities respectively, in a simultaneous order.

The above perspective from which the data was considered would, for want of a more precise label, be described as the relative efficiencies in different levels of perceptual modalities among the two cultural groups.

Another prespective would be to consider the hierarchical relationship of the various modalities and manner of presentation (Table 15). Table 15 interestingly revealed that only in the case of stimuli presented in the tactile modality was there a difference in the hierarchical order of performance in both cultures. That is, the Sierra Leone groups performed better with successive presentations whereas the Canadian groups did better with simultaneous presentations and less well with successive presentations.

Sensotypes

One of the motivations for this section of the study was to examine the concept of "sensotypes" suggested by Wober (1966). Wober was borrowing from McLuhan (1962) who explained the orientation to different styles of communication which are influenced by different apparatuses as the 'Gutenberg Galaxy.' Wober considered that a parallel could be derived from the way different cultures seemed to be oriented towards or influenced by different communication media or perceptual modes.

> The parallel idea is that different styles of communication (oral tradition, print, or electric recording) are related to different modes of sensory elaboration (apparatus internal to the individual) adapted to these communication media. These different modes or types of sensory elaboration are labelled sensotypes (Wober 1966, p. 188).

The concept, sensotypes, was introduced in Wober's assessment of field-dependence and independence as applied by

Dawson (1963) and Berry (1965) within the framework of Witkin's theory of psychological differentiation, in non-European contexts. Berry however has himself cast doubt (in 1971) on this previous (1965) research which was subsequently published in 1966(b). Dawson on the other hand had proceeded with a related research (1967) to which frequent reference has been made by the present author. Wober's (1966) contention was that the tests used by Dawson and Berry did not permit the Sierra Leone samples to express their abilities through their more efficient sensotype. Wober's (1967) attempt to confirm this concept of sensotypes has however been criticized (Witkin and Berry, 1975) because he used a smaller size of the apparatus than the one usually employed in field-dependent and field-independent studies, that is the Rod and Frame Test (RFT). Incidentally, neither Dawson (1963, 1967) nor Berry (1965, 1966(b)) used the RFT in their studies. Also in the same paper (Witkin and Berry, 1975) reference was made to the "confounding influence of E-effect" in Wober's results, and the conclusion was reached that "the evidence provided by Wober does not seem to shed much light on the role of specialized experiences in cognitive development" (p. 26).

The first step that this author felt was necessary was to establish the fact of sensotypical behaviours in different cultures. This was not easy. However one small step has been accomplished by the present study. That is, if there are cultural sensotypes the results from our data (Table 15) would seem to indicate that some Canadian and Sierra Leone children have very similar sensotypes. If we dispensed with the basic concept of sensotypes we would still be faced with the presence of an information processing phenomenon which may or may not be radically different in different cultures but which certainly seems to reflect a hierarchical efficiency in the utilization of various perceptual modalities.

Let us consider the IQ groups again. In terms of the relative efficiencies in the different perceptual modalities among the two IQ groups, it was observed (Table 18) that the high IQs always showed greater accuracy than the low IQs in processing stimuli in different perceptual modalities. But Table 16 would further reveal that the hierarchical order of performance was relatively consistent and quite similar to the sequence found among the cultural groups. In fact, except in the case of the order of performance in tactile successive and simultaneous respectively the patterns are identical across the two cultures and the two IQ groups. However, the picture became less clear when the high and low IQ groups were separated in each culture, as Table 17 revealed. For easy comparison the mean scores have been given with the hierarchical order of performance included in parenthesis.

Table 16

Hierarchical Performance of IQ Groups

High IQ	Low IQ
1. Visual-Simultaneous	1. Visual-Simultaneous
2. Visual-Successive	2. Visual-Successive
3. Tactile-Successive	3. Tactile-Simultaneous
4. Tactile-Simultaneous	4. Tactile-Successive
5. Auditory-Successive	5. Auditory-Successive
6. Visual/Tactile-Simultaneous	6. Visual/Tactile-Simultaneous

Table 17

Mean Scores and Hierarchical Performance of IQ Groups in Each Culture

Test Variables		High IQ (SL)	Low IQ (SL)	High IQ (CAN)	Low IQ (CAN)
Visual/Visual Successive Matching	M	5.33(2)	4.85(1)	5.73(2)	3.71(3)
Auditory/Auditory Successive Matching	M	4.33(5)	3.63(5)	5.40(4)	3.29(5)
Tactile/Tactile Successive Matching	M	5.31(3)	4.49(3)	5.38(5)	3.50(4)
Visual/Visual Simultaneous Matching	M	5.52(1)	4.75(2)	5.88(1)	3.93(2)
Tactile/Tactile Simultaneous Matching	M	5.08(4)	4.35(4)	5.53(3)	4.00(1)
Visual/Tactile Simultaneous Matching	M	3.94(6)	3.28(6)	4.92(6)	3.12(6)

It would be seen that in Sierra Leone the hierarchical order of performance for low and high IQ respectively remained consistent for the following areas and in the order stated below.

Tactile-Successive
Tactile-Simultaneous
Auditory-Successive
Visual/Tactile-Successive

The pattern of the order of heirarchical performance was however disrupted for the following

Visual-Successive
Visual-Simultaneous

In Canada only in one modality area was there consistency between the high and low IQ groups in respect of order of hierarchical performance. That was Visual/Tactile-Simultaneous.

The picture now seemed to indicate that the hierarchical order of efficiency in information processing might be clearer among the groups in Sierra Leone than in Canada.

This intricate picture of the relationship among modalities was surprisingly obliterated when the types of presentations were fused to provide a score for only the major modality areas (auditory, visual, tactile, and cross-modal). The order of the mean scores in Table 18 shows the hierarchical pattern for both cultures when no distin-

Table 18

Modalities Tests with Simultaneous and Successive Presentations Combined

Modalities Tests*		Means and Standard Deviations			
		Sierra Leone		Canada	
		High IQ	Low IQ	High IQ	Low IQ
Visual	M	5.43	4.81	5.81	3.82
	SD	0.64	1.02	0.37	1.72
Tactile	M	5.20	4.42	5.46	3.75
	SD	0.75	0.89	0.68	1.55
Auditory	M	4.33	3.63	5.40	3.29
	SD	1.34	1.19	0.99	1.52
Cross-modal (vis-tac)	M	3.94	3.28	4.92	3.12
	SD	1.02	1.11	1.06	1.46

Table 19

Summary of ANOVA for Visual Modality Test

	Df	MS	F	P
Sierra Leone vs. Canada	1	3.67	3.58	0.06
High IQs vs. Low IQs	1	88.86	81.71	0.01
Interaction	1	23.69	23.09	0.01
Error	203	1.03		

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* The main modality areas are listed in the hierarchical order of their performance.

ction was made between successive and simultaneous presentations. That is the more global the test the less likely it was to observe patterns of differences in performance among the two cultures or among the two IQ groups. For example when the presentation scores were combined the relative efficiencies of the modalities were identical across the four groups; the hierarchical order being visual, tactile, auditory, and the cross-modal. Comparison across cultural groups showed that the Canadian groups performed significantly better than the Sierra Leone groups in the auditory and cross-modal tasks. But there were no significant cultural differences in the visual and tactile modalities. The summary of the ANOVAS for these analyses are presented in Tables 19 to 22. Clearly, the observed performance of the two cultural groups appeared unequivocally clear when the various levels of stimulus complexity were not considered.

Dawson (1967) then was probably not involving the "wrong" modality when he used predominantly visual tests as the Sierra Leone group showed a relatively high efficiency in the visual modality. Demands on the visual modality should not have put the Sierra Leoneans at a disadvantage. However, the question would remain unresolved until the stability of a hierarchical order among modalities has been further confirmed. Since Dawson (1967) used mainly adults in his study it will be necessary to

Table 20

Summary of ANOVA for Tactile Modality Test

	Df	MS	F	P
Sierra Leone vs. Canada	1	1.69	1.75	0.19
High IQs vs. Low IQs	1	76.82	79.55	0.01
Interaction	1	11.00	11.39	0.01
Error	203	0.97		

Table 21

Summary of ANOVA for Auditory Modality Test

	Df	MS	F	P
Sierra Leone vs. Canada	1	7.93	5.08	0.03
High IQs vs. Low IQs	1	97.67	62.76	0.01
Interaction	1	25.30	16.21	0.01
Error	203	1.56		

Table 22

Summary of ANOVA for Crossmodal (Visual-Tactile) Test

	Df	MS	F	P
Sierra Leone vs. Canada	1	9.69	7.25	0.01
High IQs vs. Low IQs	1	74.57	55.80	0.01
Interaction	1	16.50	12.35	0.01
Error	203	1.34		

also investigate developmental changes in modality strengths and weaknesses from a cross-cultural standpoint, in order to determine whether age is an additional factor which mediates performance.

Wober (1967) on the other hand had suggested that the sensotype in West Africa was not visual. He felt that the auditory or proprioceptive domain was more efficient in this part of the world. The present study would seem to indicate a relatively higher efficiency in the visual than in the auditory medium.

In summary, there was no significant effect for culture when all presentations were considered in respect of the total number of accurate comparisons made between the patterns presented. There were also, no significant cultural differences when the data was examined for successive and simultaneous presentations respectively. However, the high IQ outperformed the low IQ in the total test as well as when differentiated into successive or simultaneous presentations. The high IQs consistently did better than the low IQ groups regardless of how the data was analyzed. The picture evolved further to produce different patterns of similarities and differences among the four groups with respect to the hierarchical order in the relative efficiency of the various perceptual modalities. This variety in the pattern of relative efficiencies among the modalities seemed to disappear when the simultaneous and successive levels were combined. In this final picture, then, the same heirarchical order emerged among the four sample groups. Visual modality showed the best performance followed by tactile, auditory and cross-modal (that is visual-tactile). The absence of a significant difference for culture was unexpected in the visual and tactile modalities. Equally so the presence of a significant difference for culture for the auditory and cross-modal tasks was surprising. Based on Wober's (1967) suggestion of a major difference in "sensotypes" between Western and non-Western populations one would have expected different results, with the Sierra Leone groups showing greater proficiency for auditory abilities and the Canadian groups being more proficient in the visual modality.

The consistently superior performance of the high IQ groups over the low IQ groups seem to underscore the importance of intellectual proficiency in information processing involving short-term memory regardless of modality or culture.

The cross-modal tasks proved more difficult than any other modality tasks in both Canada and Sierra Leone. This finding is not surprising in view of Birch and Belmont's (1964) research which produced similar conclusions. Though the present study could not be considered decisive on the issue of the status of cross-modal matching vis-a-vis unimodal matching, it does offer a cross-cultural confirmation of the Birch and Belmont hypothesis.

The Emergence of Modality Factors

Factor analysis was performed on all the modality tasks in order to observe their factor loadings. The resulting uninterpretable pattern of loading led to another set of factor analysis, based only on the major modality areas of Auditory, Cross-modal, Visual, and Tactile performance. The results of the factor analysis for each IQ group in Sierra Leone and Canada are given in Tables 23 to 26.

These tables present a definite difference in the pattern of loadings for the Sierra Leone and Canadian groups respectively. Whereas the Canadian samples seemed to have responded to the tasks as if there were no modality differences (Table 25 and 26), the Sierra Leone sample appeared to make distinctions on the basis of modalities (Tables 23 and 24). It is interesting to note that while both high and low IQs in Sierra Leone were sensitive to the different modalities involved in the tasks, these groups nevertheless appeared to have used distinctly different bases on which they differentiated among the modalities. In the case of the high IQ the visual and auditory modality tasks were distinguished from the Tactile and cross-modal tasks (Table 23). In the case of the low IQ group the Tactile and Visual tasks were distinguished from the Cross-

Table 23

Rotated Factors (Varimax) For Sierra Leone High IQ N=48

Modality Tasks	Factor 1	Factor 2
Visual	0.845	-0.124
Tactile	-0.067	0.818
Auditory	0.768	0.229
Cross-modal (Visual-Tactile)	0.144	0.711

Table 24

Rotated Factors (Varimax) For Sierra Leone Low IQ N=57

Modality Tasks	Factor 1	Factor 2
Visual	0.843	0.097
Tactile	0.901	-0.008
Auditory	0.177	0.680
Cross-modal (Visual-Tactile)	-0.103	0.824

Table 25

Rotated Factors (Varimax) For Canada High IQ N=60

Modality Tasks	Factor 1
Visual	0.660
Tactile	0.736
Auditory	0.692
Cross-modal (Visual-Tactile)	0.738

Table 26

Rotated Factors (Varimax) For Canada Low IQ N=42

Modality Tasks	Factor 1
Visual	0.938
Tactile	0.917
Auditory	0.868
Cross-modal (Visual-Tactile)	0.866

modal and auditory tasks (Table 24). As could be seen from Table 23, the visual element was dominant in one factor whereas the tactile element was dominant in the other factor for the high IQ group. In Table 24 however, the pattern was different, with the tactile element being dominant in one factor and the cross-modal element being dominant in the other factor. This pattern of factors appears to show the tactile modality as a dominant element in both the low and high IQ groups, whereas the dominance of the visual and cross-modal elements appear to distinguish the low IQ from the high IQ group in Sierra Leone. However one should be aware of the small sample sizes. In view of this the differences in factor loadings are only suggestive rather than conclusive. The complex relationships which seemed to emerge among the modalities in this study indicated the need for further analysis to uncover underlying influences which may cut across cultural and IQ groupings.

Simultaneous-Successive Processing and Modalities: Median-Split Analyses

Das (1973a, 1973b) and his students (Krywaniuk, 1974, Molloy, 1973; Das, Kirby and Jarman, 1975) suggested a theory of cognitive functioning under the rubric, successive and simultaneous functioning.

As explained by Das et al. (1975) simultaneous processing is the integration of separate elements into quasi-spatial groups. This synthesizing process which appears to be spatially based results in products which, characteristically, are entirely and equally surveyable from any point, without regard to the serial position or sequential relationship of the parts. Successive processing on the other hand, typically involves seriation and produces quasi-temporal groupings which depend on the sequential relationships and serial position of the parts for their intelligibility. A good example of simultaneous processing would be visual perception, whereas human speech would best demonstrate successive processing. As presented here, this is a simplistic formulation of the complex processes underlying Luria's physiologically-based theory of information processing (Luria, 1966a, 1966b; Luria and Tzvetkova, 1967; Das, Kirby and Jarman, 1975). Notwithstanding the examples given of the two kinds of processing, it is believed that the form of input does not necessarily determine the form of processing. For example visual stimuli could be processed successively or simultaneously as could auditory material. In other words, response patterns may be the result of either successive or simultaneous processing of sensory stimuli which need not have originated in corresponding form. Das (et al. 1975) suggested that the choice of the mode of processing would depend on sociocultural and genetic factors on the one hand, and the demands of the task on the other.

The question thus would arise regarding the degree to which cultures are different or similar in their tendency toward simultaneous and successive processing. As well, one would be interested in observing the effect of various kinds of tasks on the type of processing applied.

It is the second aspect of the above question that appears to be implicated in the way the two major cultural groups performed in the Modalities Tests. In other words the present writer expected that the mode of processing would not be influenced by simultaneous or successive modes of presentation.

In order to observe these process in action, certain tests have usually been used. The tests for simultaneous processing include the Raven's Progressive Matrices, Figure Copying, Memory for Designs and certain tests utilizing cross-modal presentations; those for successive are visual short-term memory tests, as well as tests of serial and free recall. Characteristically, the Raven's Coloured Progressive Matrices and Figure Copying have loaded on the simultaneous factor whereas the successive factor has been exemplified by Serial and Free Recall Tests. Although the full battery of simultaneous-successive tasks was not administered in the present study, one marker test from simultaneous (Figure Copying) and one from successive (Serial Recall) were available. In order to assess the effects of these modes of processing on the subjects' performance in various tasks, a median-split analysis was done. Using the Serial Recall test as a "marker" for successive processing the scores for this test were split at the median for each of the two major cultural groups. This resulted in a high and low group for successive processing in Sierra Leone and two similar groups in Canada. The same procedure was done using the Figure Copying test as a "marker" for simultaneous processing.

It was now possible to compare the performance of the samples in various other tests on the basis of their relative strengths in simultaneous and successive processing. Comparisons were made by subjecting the groups to a series of ANOVA tests. This analysis was performed on all major clusters of tests used in this study. In this section the Modalities tests will be discussed in relation to successive and simultaneous processing. The mean scores for the various methods of presentations are given in Tables 27 to 29.

It was interesting to note that in all the presentations the high successive and high simultaneous groups performed significantly better than the low successive and low simultaneous groups respectively. The summaries of the ANOVAS are given in Tables 30 to 33. These results would seem to show that strength in both simultaneous

Table 27

Comparison between High and Low Successive and Simultaneous Groups on Modalities Tests

		Means and Standard Deviations (SD's)			
		Successive		Simultaneous	
		High N=104	Low N=103	High N=104	Low N=103
All modalities and presentations	M	30.93	24.41	30.28	25.29
	SD	3.69	7.47	4.36	7.21
Successive Presentations	M	15.72	12.24	15.27	12.70
	SD	2.01	3.72	2.45	3.86
Simultaneous Presentations	M	15.21	12.32	15.01	12.52
	SD	2.16	3.78	2.46	3.74

Table 28

Comparison Between High and Low Successive and Simultaneous Groups on Modalities Tests (Breakdown)

		Means and Standard Deviations			
		Successive		Simultaneous	
		High N=104	Low N=103	High N=104	Low N=103
Visual-Visual (Successive)	M	5.50	4.48	5.45	4.52
	SD	0.75	1.55	0.86	1.53
Auditory-Auditory (Successive)	M	4.91	3.55	4.63	3.84
	SD	1.29	1.37	1.34	1.54
Tactile-Tactile (Successive)	M	5.31	4.17	5.19	4.28
	SD	0.85	1.56	1.02	1.52
Visual-Visual-(Simultaneous)	M	5.63	4.55	6.12	4.47
	SD	0.71	1.59	0.74	1.58
Tactile-Tactile (Simultaneous)	M	5.25	4.33	5.12	4.47
	SD	0.96	1.41	1.00	1.46
Visual-Tactile (Simultaneous)	M	4.31	3.34	4.24	3.50
	SD	1.20	1.38	1.33	1.29

Table 29

Comparison Between High and Low Successive and Simultaneous Groups on Modalities Tests with Successive and Simultaneous Presentations Combined

Ranked in order of Relative Proficiency		Means and Standard Deviations (SDs)			
		Successive		Simultaneous	
		High N=104	Low N=103	High N=104	Low N=104
1. Visual	M	5.46	4.58	5.43	4.61
	SD	1.00	1.39	1.03	1.39
2. Tactile	M	5.81	4.32	5.06	4.42
	SD	1.02	1.25	1.11	1.24
3. Auditory	M	4.90	3.53	4.54	3.88
	SD	1.35	1.36	1.47	1.50
4. Visual-Tactile (Cross-Modal)	M	4.25	3.45	4.16	3.56
	SD	1.33	1.32	1.45	1.26

Table 30

Summary of ANOVAS for Successive and Simultaneous Groups Modalities Tests

Type of Test	Type of Groups	DF	MS	F	P
All Modalities and Presentations	High vs. Low Successive Groups	1	2206.8	66.16	0.01
	Error	203	33.36		
	High vs. Low Simultaneous Groups	1	1289.5	40.27	0.01
	Error	203	32.02		
Successive Presentations	High vs. Low Successive Groups	1	626.3	73.06	0.01
	Error	203	8.57		
	High vs. Low Simultaneous Groups	1	341.9	36.22	0.01
	Error	203	9.44		
Simultaneous Presentation	High vs. Low Successive Groups	1	433.6	47.53	0.01
	Error	203	9.12		
	High vs. Low Simultaneous Groups	1	320.5	34.90	0.01
	Error	203	1.99		

Table 31

Summary of ANOVAS for Successive and Simultaneous Groups on Modalities Test (Breakdown Successive Presentations)

Type of Test	Type of Groups	DF	MS	F	P
Visual-Visual (Successive)	High vs. Low Successive Groups	1	54.20	38.6	0.01
	Error	203	1.40		
	High vs. Low Simultaneous Groups	1	44.45	30.72	0.01
	Error	203	1.45		
Auditory-Auditory (Successive)	High vs. Low Successive Groups	1	96.11	58.69	0.01
	Error	203	1.64		
	High vs. Low Simultaneous Groups	1	31.73	17.37	0.01
	Error	203	1.83		
Tactile-Tactile (Successive)	High vs. Low Successive Groups	1	67.42	43.94	0.01
	Error	203	1.53		
	High vs. Low Simultaneous Groups	1	42.81	26.60	0.01
	Error	203	1.61		

Table 32

Summary of ANOVAS for Successive and Simultaneous Groups on Modalities Test (Breakdown Simultaneous Presentations)

Type of Test	Type of Groups	DF	MS	F	P
Visual-Visual Simultaneous	High vs. Low Successive Groups	1	54.41	40.07	0.01
	Error	203	1.48		
	High vs. Low Simultaneous Groups	1	59.41	40.83	0.01
	Error	203	1.45		
Tactile-Tactile Simultaneous	High vs. Low Successive Groups	1	43.89	30.22	0.01
	Error	203	1.45		
	High vs. Low Simultaneous Groups	1	21.89	14.62	0.01
	Error	203	1.50		
Visual-Tactile Simultaneous (Cross-modal)	High vs. Low Successive Groups	1	39.50	25.83	0.01
	Error	203	1.52		
	High vs. Low Simultaneous Groups	1	28.21	18.56	0.01
	Error	203	1.52		

Table 33

Summary of ANOVAS for Successive and Simultaneous Groups on Modalities Test with Successive and Simultaneous Presentations Combined

Type of Test	Type of Groups	DF	MS	F	P
Visual	High vs. Low Successive Groups	1	40.04	28.02	0.01
	Error	203	1.43		
	High vs. Low Simultaneous Groups	1	34.53	23.88	0.01
	Error	203	1.45		
Tactile	High vs. Low Successive Groups	1	38.47	29.62	0.01
	Error	203	1.30		
	High vs. Low Simultaneous Groups	1	21.19	15.66	0.01
	Error	203	1.35		
Auditory	High vs. Low Successive Groups	1	97.28	57.08	0.01
	Error	203	1.70		
	High vs. Low Simultaneous Groups	1	22.28	11.21	0.01
	Error	203	1.99		
Visual-Tactile	High vs. Low Successive Groups	1	32.91	20.27	0.01
	Error	203	1.62		
	High vs. Low Simultaneous Groups	1	18.30	11.10	0.01
	Error	203	1.65		

and successive processing was advantageous in the performance of modality tests. The same results were evident when the types of presentation were ignored and the four major areas of visual, auditory, tactile and cross-modial were considered. The analysis clearly show that the manner of stimulus presentation were not necessarily related to the processing mode that the subject would find preferable. Das et al. (1975) had explained this fact in their theory of successive and simultaneous processing; that input could be simultaneous or successive, but that central processing was relatively uninfluenced by the manner of input. This aspect of the theory as verified by the present results appear very plausible when the nature of the task is considered. In this case the subject was presented with two stimulus patterns, either serially or simultaneously. In effect the subject had to retain these two patterns in short-term memory and then make a comparison as to whether they were similar or not. Regardless of the manner of presentation (that is successively or simultaneously) the two patterns had a temporal relationship. As such successive processing skills should be proficient in order to process that aspect of the stimulus patterns. The next step in the process would require the subject to be able to survey the entire stimulus array (that is, the two patterns) in order to make a comparison of their various characteristics. In short it seems necessary that a subject should be proficient in both successive and simultaneous processing to be able to perform the modalities tests presented in this study.

The other finding of some importance for simultaneous-successive theory is in Table 28. Here it can be clearly seen that sensory modality and successive-simultaneous processing are practically unrelated; that is proficiency in simultaneous processing is not reflected in information processing in the visual mode to the exclusion of the auditory mode. Similarly proficiency in successive processing is not reflected in performance in both auditory and visual tasks.

Summary

The following were the findings in this chapter:

1. There were no differences in the total modality tasks attributable to culture.
2. There were however specific differences in the performance of modality subtests due to culture.
3. The factor analyses showed that the high and low IQ groups from Sierra Leone appeared to have distinguished among the modality tasks on the basis of the dominance of a visual and tactile element respectively. The Canadian IQ groups made no such clear distinctions.

These observations would seem to cast doubt on the expectation of a culturally dominant sensotype for either Sierra Leone or Canada.

4. The high IQ group from each culture consistently showed better performance than the low IQ groups. This observation would seem to indicate that performance in modality tasks is mediated more so by intellectual ability than by cultural setting.
5. By imposing a median-split analysis, it was observed that subjects high in both successive and simultaneous processing skills performed consistently significantly better on these tests than those who were low in both areas. The relationship between IQ and successive and simultaneous processing was however not established in this study.
6. In general this chapter has illustrated the complexity involved in information processing in a cross-cultural framework, whether in regard to the concept of sensotypes (as proposed by Wober, 1966) or perceptual abilities in general (as investigated by Dawson, 1967). It has been shown to be unclear whether a cultural group can be described as weak or strong in specific perceptual areas relative to another culture even when the tasks involved are unimodal, discrete and presented in timed sequences.

CHAPTER 10

Categorization

When Cole et al. (1971) investigated cateogorization abilities in West Africa, the pattern of performance encountered among the Kpele was found to be different from the way North Americans typically performed in those tasks. The principle used by the Kpele was called "functional entailment" (Cole et al. 1971, p. 79). That is, the functional or utilitarian value of the object appeared to have been the basis on which the Kpele typically grouped objects.

It was expected that this principle would be confirmed in Sierra Leone, whereas the Canadian samples were expected to use a different principle. That is they were expected to perform similarly to samples from the United States which tend to use abstract categories in categorization. The different results from the two countries were expected from both the manner in which the objects were grouped as well as from the type of justifications given for forming the groups. The main test used in this part of the study has been described in Chapter 8.

This task, as described in Chapter 8 included for each culture objects which were familiar. For example whereas items such as glass, lemon and axe were familiar objects in both Sierra Leone and Canada they were not as important in Sierra Leone as in Canada. In Sierra Leone such items as calabash, coconut and hoe, had greater ubiquity and utility than the others previously named. Many families used a calabash, coconut and a hoe as utensil, food and tool respectively, more than they did a glass, lemon or axe.

Mean scores for both the main categorization test and the subtests are presented in Table 34. A direct comparison of the two countries in respect of culture and IQ has been made as seen in this Table. This comparison is considered valid because the tasks have been selected on the basis of cultural and conceptual equivalence and functionality. In addition, the researcher being bilingual in the two cultures gave the same instructions in the languages of the subjects from Seirra Leone and Canada. He used Krio and English respectively.

The results (Table 34) showed that the mean scores for the Canadian sample as a whole were significantly higher than those for Sierra Leone. This difference should however be considered in the light of the manner in which the test was scored as well as the types of reasons given by the subjects in each culture for categorizing the objects the way they did.

Table 34

Test of Categorization and its Subtests

Main Categorization Test and Subtests		Mean Scores and Standard Deviations			
Main Task					
		Sierra Leone (SL)	Canada (CAN)	High (IQ)	Low (IQ)
General index of Categorical Performance (combining perfect and imperfect categories)	M	51.15	72.28	65.37	57.41
	SD	20.86	12.28	18.58	21.18
Subtests					
Performance reflecting perfect sorting of FOOD	M	0.50	0.78	0.69	0.59
	SD	0.50	0.41	0.46	0.50
Performance reflecting perfect sorting of CLOTHES	M	0.66	0.83	0.79	0.70
	SD	0.48	0.46	0.41	0.46
Performance reflecting perfect sorting of UTENSIL	M	0.40	0.75	0.64	0.48
	SD	0.49	0.44	0.48	0.50
Performance reflecting perfect sorting of TOOLS	M	0.30	0.82	0.64	0.46
	SD	0.46	0.39	0.48	0.50

Scoring Criteria

The scoring of this test assumed that a perfect score should be based on four main groups; food, tools, utensils and clothes. In other words, when a sorter identified these four groups among the objects, and the items included in each group was respectively identical to the lists for Sierra Leone and Canada in Table 1, his categories were considered perfect. Any other variation of these main groups was considered imperfect sorting and the categories thereby generated were also considered imperfect. In order to determine how alike a subject's sorting was with the examiner's expected categories of food, tools, utensils and clothes, the data was scored using the following equation proposed by Bersted, Brown and Evans (1970).

$$\text{ICR (Index of Categorical Responding)} = \sum_{i=1}^{N} (F_i - D_i) + C \text{ where}$$

N = number of categories used by S

F_i = number of pairs that correspond to Examine - defined category

D_i = number of pairs that correspond to Examine - defined categories

C = constant to avoid negative numbers

The index obtained from this equation represented the degree of match between a subject's categorization performance and the conventionally expected pattern (that is E-defined categories). This index was in turn subjected to an analysis of variance.

Briefly the number of categories developed by a subject was identified and in each of these categories the number of matches between any two objects was also identified. The same was done for the examiner-generated categories and the objects within the categories. The difference between the number of subject-generated matches corresponding to matches in examiner categories and those not corresponding was obtained. Ideally, when the number matched pairs in subject categories is identical with the same matched pairs in examiner categories, there were no unmatched pairs in subject categories. Frequently however the sorting done by the subjects did not achieve "perfect groups". That is a certain number of subjects groupings matched the examiner-expected groups; but there were also unmatched groups. These unmatched groups were more, less or equal to the matched pairs resulting in a negative number, a zero or a positive number respectively. To eliminate negatives and zeros a constant was added. The number thus derived was called the ICR (Index of Categorical Responding). The ICR is described in this study as a General Index of Categorical Performance (Table 34). In this case the constant, 41, was added in order to eliminate negatives and give zero values to the worst performance. Thus, the best performance indicated by a score of 81, as a perfect match (with no unmatched pairs) has given a score of 40 + 41 (the constant). In effect the highest score achievable (81) represented sorting identical with examiner-generated categories, whereas the lowest score (zero) represented sorting with the largest discrepancy between examiner-generated categories and subject-generated categories.

In order to determine whether differences in the ICR means in Table 34 were significant, ANOVAS were performed, as given in Tables 35 and 36.

General Index of Categorization (ICR)

The results of the ANOVA (Table 35) show that there was a significant effect for both culture and IQ

Table 35

Summary of ANOVA for General Categorical Performance (ICR)

	Df	MS	F	P below
Sierra Leone vs. Canada	1	21245.64	72.44	0.001
High IQs vs. Low IQs	1	1410.96	4.81	0.03
Interaction	1	124.23	0.42	0.52

Performance Reflecting Perfect Sorting of Food, Tool, Utensils and Clothes

The four categories were examined individually to determine the areas of greatest discrepancy for each group. It was however clear that in each case a significant level was reached or surpassed only in regard to culture; the Canadian samples outperformed the Sierra Leone samples. Canadian samples on the whole generated more categories sorted into perfect conventional categories than did the Sierra Leone groups. Main effects for IQ and the interaction effects were not significant (Table 36).

These results pose an interesting situation. A significant difference would not normally be expected between the two cultures because the test was developed with a view to maintaining its cultural and conceptual equivalence in each culture. This should mean that neither culture was at any special disadvantage with the test. However an examination of the reasons for the various subject-generated categories lead to a different conclusion. Three types of reasons or justifications for the groups were given by the subjects. These will now be considered.

Reasons Based on Structural or Qualitative Aspects of the Objects

After subjects had completed their sorting, they were asked to explain why they thought the objects belonged to

Table 36

Summary of ANOVA for Perfect Sorting of Food, Tools, Utensils and Clothes

	Df	MS	F	
Sierra Leone vs. Canada	1	3.71	17.40	0.001 below
(XIV) Food	1	1.42	7.80	0.006
(XV) Clothes	1	5.89	27.65	0.001 below
(XVI) Utensils	1	13.45	76.28	0.001 below
(XVII) Tools	1			
High IQs vs. Low IQs				
(XIV) Food	1	0.27	1.28	0.26
(XV) Clothes	1	0.24	1.29	0.26
(XVI) Utensils	1	0.61	2.85	0.09
(XVII) Tools	1	0.58	3.28	0.07
Interaction				
(XIV) Food	1	0.001	0.007	0.26
(XV) Clothes	1	0.57	3.11	0.08
(XVI) Utensils	1	0.53	2.49	0.12
(XVII) Tools	1	0.30	1.70	0.19

the category they had assigned to them. The responses to this question were grouped into three main categories. The present category of reasons included statements which distinguished any grouping on the basis of a generic title, the material the object was made of, and the look, feel, touch or smell of the objects. For example:

> Examiner: "Why do you think these objects (pointing to one group) belong together?"
>
> Subject: "I put them together because they are all food."
>
> OR
>
> Subject: "They belong together because they are all metal."

Reasons Based on Functional Aspects of the Objects

This category of responses included those explanations which referred to the collective use to which the objects are put. For example, a subject would say:

> "I put them together because we make things with them."
>
> OR
>
> "They are things used for preparing food and eating food."

Reasons Based on Non-Relatedness of an Object

In a few instances the subjects found certain objects uncategorizable. Each time this was the case, the subject put the object apart by itself. The reasons given were varied, but usually conveyed the idea of the non-relatedness of these objects with any others currently being categorized. Characteristic responses included the following:

> "I don't know where to put this, so it stands along."
>
> "This one has no partners."
>
> "This one does not fit anywhere."

Table 37 presents the results in the form of percentages. These percentages were derived from the total number of reasons given by each group.

Table 37

Frequencies of the Main Types of Reasons for Subject-Generated Categories in Unconstrained Sorting.

	Percentages			
	Sierra Leone	Canada	High IQ	Low IQ
Reasons based on STRUCTURAL or QUALITATIVE characteristics of the objects	34.9	50.7	45.1	38.5
Reasons based on FUNCTIONAL characteristics of the objects	59.5	39.2	45.9	55.6
Reasons based on NON-RELATEDNESS of object to others	5.6	10.1	9.0	5.9

As will be observed from the percentages of each type of justification (Table 37) the subjects from Canada used the qualitative aspects of the objects in forming their categories much more often (50.7%) than did the Sierra Leone subjects (34.9%). In contract, the Sierra Leone group used functionality as a strategy for category membership much more often (59.9%) than did the Canadian group (39.2%). On the whole however, all four groups were able to note categorizable characteristics in most of the objects. This seemed apparent from the low percentages for reasons indicating that an object was not related to the others.

Quite clearly the two cultural groups were guided by two distinctly different principles when they engaged in the sorting of common objects. This fact then explains the meaning of the results obtained from the ANOVA (Table 34). In these results the Canadian groups had performed "better" than the Sierra Leoneans. It was noted at that point that the general Index of Categorical Performance (ICR) was arrived at by determining the degree of discrepancy between the items in the categories developed by the subject and those of the examiner. However, these examiner categories were in fact based on structural and qualitative similarities. That is the main groups of food, tools, utensils and clothes were based on a generic title. As such, subjects who used the qualitative or structural aspects of the objects as the principle for group membership should perform "better". In other words these subjects would be expected to generate the same types of groups as the examiner did in developing the test. In contrast, subjects who applied functionality as a basis for group membership would perform "poorly" because their categories deviated drastically from the "correct" solution.

These results throw some light on Berry's (1969) formulation of the emic-etic aspects of testing. Berry had suggested that conceptual equivalence was equally as important as functional equivalence. However conceptual equivalence goes beyond knowing what the object was and what it was used for. The present study has indicated that the conceptualization of the task itself may vary with different cultural groups in unexpected ways. In Canada the children mainly responded with generic categories, whereas in Sierra Leone they mainly responded with functional categories. Using the types of reasons as the basis for describing the modus operandi of the two cultural groups, it was clear that the test that was presented to the Canadian sample (a generic based grouping) was compatible with their modus operandi. The Sierra Leoneans, however, judging by the lower frequency of the qualitative reasons, were presented with a task requiring a relatively alien modus operandi. Their modus operandi appeared compatible with a functionally based grouping.

On the whole however, these results appear to provide support for the principle of functional entailment encountered by Cole and others in Liberia (1971, p. 79). Cole and his colleagues had observed that the Kpele subjects in their studies usually grouped objects on the basis of their functional relationship and seldom on the basis of their qualitative or structural similarities. They therefore suggested that the dominant mode of classification in this pilot work was what they have called "functional entailment." It would appear that among Sierra Leone children the concept of functional entailment provides a valid basis for explaining categorization performance.

Constrained Categorization (Frequencies of Mediators)

In this test the examiner limited the scope of the subject' choices by presenting two objects set apart. The subject was then requested to insinuate a third object between the two which would result in a describable category. After each choice all three objects were returned to the total group. The frequency with which a subject selected any mediator was noted. The data was then analysed on the basis of three types of mediators, that is, FOOD, TOOLS and UTENSILS. The fourth category (CLOTHES) was ommitted in this test as it was in the case of the study by Cole, Gay, Glick and Sharp (1971). The mean scores are given in Table 38 and a summary of the ANOVA is given in Table 39. It will be observed (Table 38 and 39) that there was only one case (utensil) in which a significant level was achieved. This significant difference was unexpected and cannot at this time be explained. However as Tables 38 and 39 show, the Canadian samples chose a utensil object significantly more often than did the Sierra Leone subjects.

Table 38

Constrained Categorization (Frequency of Mediators)

	Sierra Leone	Canada	High IQ	Low IQ
Food Mediator				
Mean	6.41	6.42	6.63	6.18
SD	1.84	1.45	1.59	1.72
Utensil Mediator				
Mean	4.81	4.86	5.10	5.03
SD	1.75	1.36	1.55	1.43
Tool Mediator				
Mean	6.64	6.19	6.27	6.58
SD	1.93	1.55	1.69	1.85

Table 39

Summary of ANOVAS for the frequencies of FOOD, TOOL and UTENSILS as Mediators in Constrained Sorting.

	Df	MS	F	P	Mediator Category
Sierra Leone vs. Canada	1	0.12	0.04	0.84	FOOD
	1	9.19	4.17	0.04	UTENSIL
	1	8.92	2.88	0.09	TOOL
High IQ vs. Low IQ	1	10.47	3.82	0.052	FOOD
	1	0.01	0.01	0.94	UTENSIL
	1	3.23	1.04	0.31	TOOL
Interaction	1	3.32	1.21	0.27	FOOD
	1	0.02	0.01	0.92	UTENSIL
	1	2.79	0.90	0.34	TOOL

In effect when the task was constrained and consequently made more difficult the significant difference for IQ or culture did not occur. That is the groups' performance was indistinguishable on all the main parameters of comparison. Once again however a look at the reasons for choosing the mediators revealed some idiosyncrasies. Four main types of reasons were identified. Two of these (qualitative and functional types) have been discussed earlier. The two new types will now be discussed.

Reasons Based on Likeness of Mediator to Another Object

The responses represented in this group involved justifications that made reference only to two of the three objects and ignored the third object. This type of response tended to occur when the two objects presented to the subject did not belong to the same conventional group. For example when a food item was presented with a utensil item, the subject would choose either a food or a utensil mediator. The justification would then refer to the two food items or the two utensil items, and the different item was ignored.

Reasons Based on a Transitive or 'Chain Link' Relationship

A novel type of justification was encountered in this group of responses. The subject saw the three objects as related when the first was related to the second in some way and the second was related to the third in some other way. Also a relationship was noted among three objects when the mediator was related to the first object in some way and related to the third object in some other way. For example:

1. "I chose the knife to put between the orange and the axe because you can cut the orange with the knife and the knife and the axe are both tools."

The mean scores of each type of response were summated and expressed as a percentage of the total number of responses given by eacy group. The percentages for each type of reason or justification are presented in Table 40. According to Table 40, the highest percentages obtained represented

Table 40

Frequencies of the Main Types of Reasons for Subject Generated Categories in Constrained Sorting

Frequencies of Reasons for Choise of Mediators in Constrained Sorting	Percentages			
	Sierra Leone	Canada	High IQ	Low IQ
Reasons based on STRUCTURAL or QUALITATIVE characteristics	20.0	26.6	25.2	20.9
Reasons based on FUNCTIONALITY	46.1	49.0	48.2	46.6
Reasons based on LIKENESS (of mediator) TO ONE OTHER OBJECT (ignoring the third)	18.1	12.9	12.0	20.6
Reasons based on a TRANSITIVE or 'CHAIN-LINK' RELATIONSHIP (1←2←3 or 1→2←3)	15.1	11.5	14.6	11.9

reasons based on the functional aspects of the objects.

These results for categorization raise a few questions. For example, in the unconstrained task when the choice of all the members of the group was left with the subject, the Canadians used a sorting principle largely based on the qualitative or structural characteristics of the objects. But when the task was constrained and the subject was required to complete a group partly formed by the examiner, the Canadian groups changed the basis on which they sorted, from using structural characteristics to using functional characteristics of the objects. The Sierra Leone groups on the other hand used the same principle (functional characteristics) in both instances. This was expected, as a further confirmation of the principle of functional entailment.

But why did the Canadians shift their strategy? Did they perhaps find the use of qualitative and structural characteristics somewhat unwieldy? Which strategy was in fact more effective or efficient than the other; using a qualitative or structural sorting principle or using a functional sorting principle? Attempts to answer these questions will only be speculative at this time. The second issue will be tackled first. An indirect inference can be made about the efficiency of a strategy if we assume that the high IQ groups would choose the more efficient strategy for any cognitive task. In this study on categorization the high IQ group showed no particular preference for either the structural and qualitative or the functional aspects of the objects as a guiding principle, when the task was unconstrained. But when the task was constrained and therefore provided less freedom for the subject to choose his own grouping concept, the high IQ relied quite heavily on the functional aspects of the objects. The high IQ, it seemed, had to discard a less efficient strategy for a more efficient one when the task was made more difficult. But then if this deduction is valid, equally so should be the view that the low IQ who, like the Sierra Leone group, consistently based their sorting on functional characteristics, must be using a less efficient strategy. (This inference being based on the assumption that the low IQ would tend to use the less efficient strategy when presented with a cognitive task.) Obviously then these assumptions that the behavior of the low and high IQ groups indicated the relative efficiencies of the strategies cannot be valid in this case. Since both IQ groups at some point relied on the functional characteristics of the objects, this approach cannot be both an effective and ineffective strategy. It would seem then that the two strategies were equally useful, but that the high IQ group showed greater flexibility in moving from one sorting strategy to the other, than the low IQ group or the Sierra Leone group. The low IQ group seemed to approach the categorization tasks rigidly perhaps for unexplained intellectual reasons whereas the Sierra Leone group rigidly stuck to the functional approach, perhaps for cultural reasons.

The difficulty in identifying one approach as a more efficient categorization strategy than the other is further exemplified by the percentage of responses indicating that an object was uncategorizable. As Table 37 shows the Sierra Leone subjects, using the functional approach, considered objects uncategorizable about 6 percent of the time, whereas, for the Canadian samples who used the qualitative approach, objects were considered uncategorizable 10 percent of the time. The percentages for the low and high IQ samples were 6 percent and 9 percent respectively. Again the functional and qualitative approaches were respectively used by these two groups. The differences in these percentages could seem to suggest that the users of the functional approach had less trouble placing certain objects in categories. On the other hand, the users of the qualitative approach found it necessary more often to isolate an object because (according to their categorization strategy) these objects were not related to the others in any way. In effect the qualitative strategy seemed to impose greater limitation on the categorizability of certain objects than did the functional strategy. This perspective provides a further illustration that using a qualitative strategy to group objects was, in this study, not necessarily more facilitative than using a functional strategy.

The reasons then for the shift by the Canadian samples from using qualitative and structural characteristics to using functional characteristics as their sorting principle could not be attributed to the greater efficiency of one strategy over the other. Once more we would speculate that the Canadians were showing this flexibility in changing strategies as part of their cultural idiosyncrasy.

The finding of a cultural difference in the approach to categorizatization introduces an interesting sideline. Greenfield and Bruner (1969), frequently referred to similarity between Wolof children with schooling and Western children. Their explanation of the closeness in the way Wolof School children performed in various tasks and how Western children performed the same tasks left the impression that schooling had in many ways removed or diluted the cultural differences in performance between Wolof and Western children. For example, in discussing the problem in relation to conservation tasks they stated (Bruner, 1973):

> Let it be noted that the Wolof school children do not differ essentially from Western children in this respect p. 372.

Here, they were explaining how differently American and European children reacted to questions requesting justification for conservation responses in contrast to the requirement of factuality that the unschooled Wolof children seemed to expect in the same test circumstance. But the emphasis on the differences between these two groups and the similarity drawn between European and Wolof children with schooling seemed to suggest the absence of a culturally mediated difference in the performance of Wolof School children. While it should be expected that certain common aspects of a western-style education would be internationally present, it would be misleading to equate the expressions of this education when encountered in different cultural settings. One difference that the present study indicated between school-going children in Sierra Leone and their counterpart in Canada was in the consistent use of functional relationship as a principle for categorical formation. Differences could be even more subtle than this, since it was observed that when faced with a different type of sorting, the Canadian children changed their categorical rules.

The point being made here is that similarities and differences among cultural groups are not as obvious as they may seem, even under controlled conditions. Thus, it would generally seem safe to assume that even when the educational (and in some cases too, the political and social) trappings of two or more different cultural groups are similar there could be subtle differences which mediate performance, and therefore many different explanations of apparently similar performance are possible.

Median-Split Analysis (Categorization)

In the preceding discussion it was suggested that the Sierra Leone children were "penalized" by the nature of the task; they were presented with a test that did not favour the dominant categorization principle the subjects seemed to have used. The involvement of successive and simultaneous processing was also considered. Accordingly, a median-split analysis was done as explained earlier. The mean scores and standard deviations are presented in Table 41.

ANOVAS indicated that there were no significant differences in performance attributable to competence associated with successive or simultaneous processing. That is, on the whole a subject's facility with successive or simultaneous processing had no significant effect on his ability to categorize familiar objects.

In conclusion, data on categorization indicated that the two cultures performed categorization very differently. The Canadians tended to be flexible in choosing a categorical principle whereas the Sierra Leoneans consistently confirmed the principle of functional entailment. The high IQ generally tended to be flexible whereas the low IQ more rigidly applied a functional principle. The data however did not permit any conclusions as to the degree of facilitation that a sorting principle based on the qualitative or structural approach had over one based on function-

Table 41

Comparison between High and Low Successive and Simultaneous Groups on Categorization.[1]

		Means and SD's			
		Successive Group		Simultaneous Group	
		High N=104	Low N=103	High N=104	Low N=103
General Index of Categorical Performance	M	62.88	60.23	61.93	61.20
	SD	19.17	21.23	21.19	19.28
Perfect sorting of Food	M	0.66	0.62	0.64	0.64
	SD	0.47	0.49	0.48	0.48
Perfect sorting of Clothes	M	0.78	0.71	0.78	0.71
	SD	0.42	0.46	0.42	0.46
Perfect sorting of Utensils	M	0.61	0.52	0.58	0.55
	SD	0.49	0.50	0.50	0.55
Perfect sorting of Tools	M	0.60	0.51	0.59	0.52
	SD	0.49	0.51	0.49	0.50

[1] No significant mean differences were obtained.

ality. Further analysis did not indicate the involvement of successive or simultaneous processing in this categorization task.

CHAPTER 11

Syllogisms

Four types of syllogisms were involved in this section of the study, as described in Chapter 8. Briefly they include:

Syllogisms relevant to Sierra Leone lifestyle
Syllogisms relevant to Canadian lifestyle
Syllogisms which were culturally irrelevant, and based on realistic expectations
Syllogisms which were culturally irrelevant and based on unrealistic or artificially created expectations.

A list of all the items is presented in Appendix II.

It was expected that the high IQ group would be generally better in syllogistic reasoning than the low IQ group. But the culturally different groups were not expected to be significantly different in their performance, because the syllogisms had equal numbers of familiar and unfamiliar items for each culture. For example the syllogisms relevant to Sierra Leone should favour the Sierra Leone sample, but not the Canadian sample. The syllogisms relevant to Canada should favour the Canadian sample but not the Sierra Leone sample. The culturally irrelevant syllogisms should be equally familiar or unfamiliar to both the Sierra Leone and Canadian samples. Accordingly then, whereas performance based on the total number of syllogisms was not expected to show a significant difference among the two cultures, a significant difference was expected among them for those items which were relevant to a specific culture. On the other hand the IQ groups were expected to show significant differences not only in the total number of syllogisms but also in those items which were culturally irrelevant. For these items (total and culturally irrelevant) the differences in performance were expected to be mainly due to intellectual proficiency. Means and standard deviations of all the syllogisms taken together are presented in Table 42, and the results of the ANOVAS are presented in Table 43.

Table 42

Means and SD's of Syllogisms.

		Sierra Leone	Canada	High IQ	Low IQ
Mixed Syllogisms (total)	M	8.92	7.97	9.68	7.12
	SD	2.06	2.73	1.92	2.32
Syllogisms relevant to	M	2.55	2.20	2.69	2.03
Sierra Leone	SD	0.58	0.93	0.54	0.88
Syllogisms relevant to	M	2.31	1.93	2.31	1.92
Canada	SD	0.82	0.82	0.71	0.93
Culturally irrelevant	M	2.18	2.02	2.36	1.82
syllogisms (realistic)	SD	0.77	0.86	0.71	0.84
Culturally irrelevant	M	1.87	1.86	2.30	1.39
syllogisms (unrealistic/ artificial)	SD	0.86	1.09	0.80	0.94

Table 43

Summary of ANOVAS for Subtests of Syllogisms

	Culture		IQ		Interaction	
	F	P	F	P	F	P
Relevant to Sierra Leone	23.6	below 0.001	26.56	below 0.001	19.32	below 0.001
Relevant to Canada	15.79	below 0.001	16.58	below 0.001	1.20	0.28
Culturally Irrelevant and Realistic	4.79	0.03	28.16	below 0.001	0.36	0.55
Culturally Irrelevant and Unrealistic	1.09	0.30	59.32	below 0.001	12.13	below 0.001
Syllogisms (Total)	22.38	0.00	96.25	below 0.001	8.37	below 0.001

Syllogisms (All items)

A total of twelve syllogisms were involved in this test. The results of the ANOVA (Table 43) indicated a significant main effect for culture, and IQ, and a significant interaction. There was a significant interaction because of the larger discrepancy between the high and low IQ groups for Canada than between the high and low IQ groups for Sierra Leone. That is, the Canadian low IQ group scored much lower than all the other groups. On the whole the Sierra Leone sample scored higher than the Canadian sample and the high IQ groups scored higher than the low IQ groups.

The superior performance of the higher IQ group is understandable. Not only were they expected to show better deductive reasoning, but being more intellectually capable they could call upon more effective cognitive strategies to solve problems even when these problems were relatively unfamiliar. As could be seen from an inspection of the mean scores for the total syllogisms (Table 42), the highest mean score was obtained by the high IQ group. This seems to indicate that the high IQ as a group found the syllogisms easier to solve than any other group. The breakdown of the mean scores and the summary of the ANOVAS (Table 43) show that in all cases where the interaction was significant, the significantly lower performance of the low IQ group from Canada was responsible.

The significantly higher mean scores for the Sierra Leone sample is noteworthy. Quite apart from cultural familiarity, one would have expected relatively less proficiency shown by this group in a verbal-logical task. Usually, it has been assumed that non-verbal tasks favour non-western groups better than verbal tasks do. In fact some writers (e.g. Biesheuvel, 1949) have recommended the elimination of all verbal material from the tests in order to control for language interferences. Because the syllogisms in this study were given in the lingua franca of the subjects, the results suggest that the use of the subjects' language provided another alternative to methodological control in cross-cultural psychology (see Ortar, 1972). It seems however that Biesheuvel's recommendation was taken just too seriously, leaving cross-cultural psychology with very little data in such areas as verbal logical thinking in different cultures.

Syllogisms Relevant to Sierra Leone

A break-down of the total number of syllogisms was carried out to indicate how the various groups performed in respect of the specific kind of syllogisms. The syllogisms treated in this section involved items with social meaning for students who live in Sierra Leone. For example: All rich people in Sierra Leone are called "gentry".

Pa Sanday is not a rich man in Sierra Leone.

Is he gentry or not?

As the results have shown (Tables 42 and 43) a significant level was reached for culture, IQ and interaction respectively. Again the low IQ group from Canada scored significantly lower than all the other groups. The Sierra Leone groups surprisingly outperformed the Canadian groups and the high IQ groups from both countries outperformed the low IQ groups from both countries.

Syllogisms Relevant to Canada

The next group of syllogistic premises was of special relevance to the social scene in Canada. For example:

All old people in Canada are called "Senior Citizens".

Chief Dan George is an old man in Canada.

Is he a senior citizen or not?

The results indicated significant main effects for culture and IQ. The Seirra Leone groups generally outperformed the Canadian groups, and the high IQ groups generally outperformed the low IQ groups. The interaction was not significant.

Once more the better performance of the high IQ group than the low IQ was expected. But the better performance of the Sierra Leoneans than the Canadians, in a task that was suppored to favour the Canadians was quite unexpected. It will be remembered however that when the subjects used logical reasoning, their answer would be correct regardless of the cultural or conceptual content of the syllogisms. It would seem that some aspect of the cultural setting in Sierra Leone promoted a better understanding of syllogistic reasoning than the Canadian setting offered.

Culturally Irrelevant Syllogisms (Realistic)

This group of syllogisms was culturally ambiguous in the sense that the premises were theoretical in nature, but utilized realistic concepts. For example:

All field sports are dangerous.
Swimming is not a field sport.
Is swimming dangerous or not?

Performance in this cluster of items once again produced significantly higher mean scores for the Sierra Leone students than for the Canadian students. The high IQ groups also outperformed the low IQ groups. There was no significant interaction effect. Once again the results for the IQ groups were expected, but the significantly higher performance for the Sierra Leone group was not expected. The results of the ANOVA performed on this test are presented in Table 43.

Culturally Irrelevant Syllogisms (Unrealistic)

This final group of syllogisms involved premises that had no special relevance for the subjects from either country. However, the items presented unrealistic or artificial situations. For example:

All dogs can fly.
All cows are dogs.
Can all cows fly or not?

In this case the groups showed no significant differences in respect of culture, but were significantly different in respect of IQ. The high IQ groups performed better than the low IQ groups. The interaction was also significant due to the disparately low performance of the Canadian low

IQ group. The results of the ANOVA are presented in Table 43.

The results so far presented indicate that the Sierra Leone group performed significantly better than the Canadians in all types of syllogisms except when the syllogisms had no specific cultural relevance and also held unrealistic or artificial expectations which sometimes contradicted the natural order of the physical world. It was also clear that the high IQ group, as a whole, performed better than the low IQ group as a whole. But the low IQ group from Canada consistently performed much lower than all the other groups.

It would seem from the means that the Canadian low IQ group least understood how to tackle syllogisms. However the low IQ groups in each culture had lower scores than their high IQ counterparts as has already been noted. So then the differences in syllogistic reasoning observed in this study were not only cultural but also intellectual. In other words, within each culture, the children's intellectual status determined how more or less proficient they were in reasoning with syllogistic premises.

Reasons for Syllogistic Responses

Following the presentation of each syllogism and a response from the subject, the examiner asked the subject to explain why he answered the way he did. These

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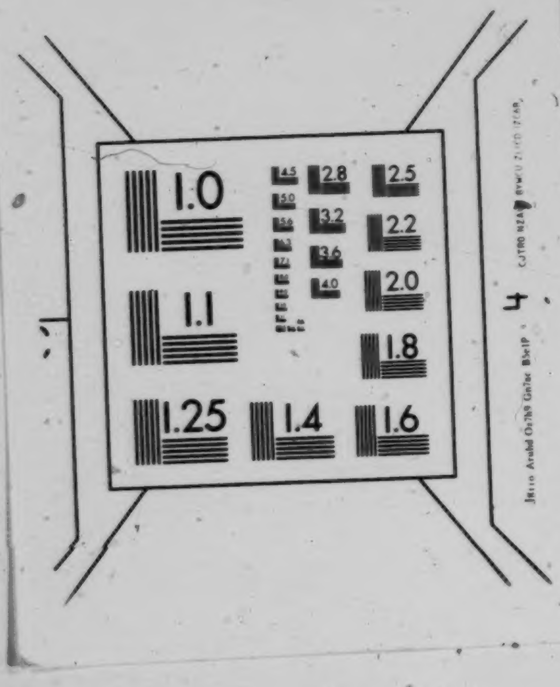

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responses which were in turn grouped into three types were as follows:

Reasons based on social/cultural experiences

Reasons based on the logical relationship of the premises

Reasons with no known basis

In each country, the researcher used the language of his subjects as previously explained and received answers in the local language. The following is a discussion of these main types of reasons.

Reasons based on social/cultural experiences

These were responses indicating that knowledge of the conclusion given was derived through previous instruction (formal or informal) or through personal knowledge of the situation mentioned in the syllogism. For example:

Important people in society look alike.
Pierre Trudeau and Bobby Hull do not look alike
Are they important or not?

Some students from Canada felt these people were not important because their parents said so. On the other hand some students felt they were important because "they just had to be; one was a Prime Minister, the other was a famous hockey player. They were always important on T.V." Some students from Sierra Leone felt they were not important because "How could you tell, they lived so far away." Others yet felt they were important because they once read that Trudeau was the Prime Minister of Canada. All these responses indicated a knowledge of the situation based on some experience of the cultural setting and not the logical relationship of the premises.

Reasons based on the logical relationship of the premises

This category contained responses which were guided only by the syllogism. For example:

All dogs can fly and
All elephants are dogs.
Can all elephants fly or not?

Some of the boys felt elephants could fly because "that's what you said. If the dogs can fly and if elephants are dogs then they could fly too." Responses indicating the ridiculousness of the premises, such as "whoever heard of dogs flying?.... Well we know that elephants are too heavy to fly" were accepted under the former category.

Reasons with no known bases

A small number of subjects gave answers for the syllogisms but did not know why they chose to respond in that way. Example or reasons included in this category included: "I don't know why," "Maybe that's the case but then again maybe not - - can't really say."

These responses were analysed by expressing the mean score for each type of response as a percentage of the total number of syllogisms. These percentages are presented in Table 44.

As the percentages indicate, the reasons for arriving at a certain conclusion were mostly based on the logical relationship of the premises. It would seem that the intellectually higher subjects used this approach far more often than did the lower IQ students. Social/cultural reasons were also given, that is reasons based on factual knowledge or on learnings or expectations conferred by being resident in a country. As noted however, this type of reasoning was used less frequently. Again the high and low extremes in performance were among the IQ groups. This time, however the Canadian low IQ seemed to have used both cultural and abstract reasoning relatively equally. When compared with the other groups, however, this group most frequently used cultural or social knowledge and least frequently used abstract logic in solving the syllogisms. Also this group most frequently gave answers from which they did not have any particular reasoning basis (19% of the time) as compared with the cultural groups who gave such answers 11% of the time.

When Cole et al. (1971) tried out some syllogisms on school going children (10-14 year olds) they found that their answers were much like American students -- largely based on an understanding of the form of the problem. That is, these students were guided more by the logical relation-

Table 44

Frequencies of the Main Types of Reasons Given as the Basis for Syllogistic Responses

Reasons for Syllogistic Responses	Percentages			
	Sierra Leone	Canada	High IQ	Low IQ
Based on social/cultural background	29.5	31.6	24.5	37.4
Based on logical relationship of the premises	59.5	57.5	71.7	43.5
Unknown bases	11.0	10.9	3.8	19.1

ship of the premises presented than by factual characteristics of the problems. The results of this study with respect to justifications were in general much like what Cole et al. (1971, Table 12) found among Liberian school children. Many children based their reasoning on the logical relationship (form) of the premises.

Luria (1976) on the other hand used syllogisms to investigate the effect of socio-historical experiences on peasants who had had no schooling. Luria's studies showed that unschooled peasants tended to use a graphic-functional approach to solving syllogisms. That is these subjects based their solutions for the syllogisms on their own real experience and in many instances failed to follow the logic presented in the premises.

In using the approach, the peasants sometimes distorted the syllogisms presented in an attempt to make sense out of them. In other examples of this approach Luria's subjects insisted on being assured that the examiner was honest about the facts in the syllogisms, usually in instances when the syllogisms demanded solutions that could not be obtained through personal knowledge of the events. Some subjects denied conclusions were possible or refused to make inferences beyond their experience.

It was interesting to note that the same characteristics of the functional-graphic approach were evident in the present thesis. Some examples of responses which reflected the graphic functional approach are given below. Only some unusual cases will be discussed.

For example:

Syllogism: Sugar cane grows in hot countries.
Sierra Leone is a hot country.
Does sugar cane grow there or not?

Subject: No.

Examiner: Why do you say so?

Subject: Because it is too sandy.

This reply was obviously not based on any information presented in the premises.

Syllogism: Islands are surrounded by water.
Iceland is surrounded by water.
Is Iceland an island or not?

Subject I: Guess it's an island... if it's not an island, how would the animals stay on it?

This reply appears to be based on the reasoning that Iceland was an island for safety reasons; to provide animals with terra firma.

Subject II: Yes (it is an island), because it is a small mass of land surrounded by water.

This subject has quite subtly interjected a learned definition of what an island is, as the grounds for believing that Iceland is an island. Intuitions of this kind by the examiner led to discussion which indicated that in fact the subjects had not used the logical relationship of the premises as the basis for solving the syllogism.

Syllogism: Wherever there is a Y there is is an X. Suppose I showed you an X, would you expect to find a Y or not?

Subject: Yes (subject then writes X), because if you knock off that thing... (i.e. the right of the two "legs" which support the capital X)... you'll get a Y.

Syllogism: All dogs can fly and all elephants are dogs. Can all elephants fly or not?

Subject I: No, because an elephant doesn't have wings and you'll have to have a plane to take it and transport it to another country.

The examiner sometimes used a "peer comparison" technique to ensure that the subject's reply was final. Typically he would say the following:

Examiner: Suppose I told you that another student I talked with said yes, elephants could fly. And you know, I read it again to him: (examiner repeated the syllogism at this point) and he said elephants could fly... What would you say to that?

Subject I: I'd say he's wrong, because elephants cannot fly really.

Subject II: No, because they're ... (examiner repeated the syllogism because the subject showed confusion.)

Reply: No, because they're supposed to be dogs.

These encounters exemplify the two kinds of reactions to those syllogisms which contradicted the experience of the subjects. In the first case, the subject ignored the logical relationship of the premises and treated the syllogism as requiring his comment (based on his knowledge or experience of real life) as to whether elephants could fly or not. The second subject tried to utilize the information in the premises. In doing so he accepted the logical relationship of the premises but denied the "facts" presented in the syllogisms. Instead he substituted his own knowledge that dogs were not capable of flying and proceeded to conclude that elephants therefore could not fly; thereby resolving the contradiction to reality that the syllogism presented.

Another trend in this study which has been mentioned earlier involved the consistently lower performance of the low IQ groups. An inspection of the types of reasons given (Table 44) would indicate that the low IQ group based their responses to the syllogisms more frequently on their socio-cultural background than any of the other groups. As indicated earlier, the use of the latter logical strategy was more likely to produce a correct solution than any other strategy. As such it is not surprising that the high IQ group who used the logical relationship of the premises about 72% of the time consistently outperformed the low IQ group who used the same strategy about 44% of the time.

In the case of the cultural groups the situation is somewhat different. In the first place the percentages for logical reasons were very similar for Sierra Leone and Canada, as were the percentages for reasons based on social-cultural background. However, in each country the logical relationship of the premises was used more often than local social knowledge.

These results bring once more into focus the question of abstract and concrete thought. For example, Vernon (1969) has stated that: "In under-developed societies, linguistic handicaps are well-nigh universal ... even the mother-tongue ... (does not) provide adequate media for advanced concepts or abstract thought" (p. 48). Both in regard to the issue to cognitive restrictions of such cultural media as language and in regard to the issue of concrete versus abstract thinking, this study does raise a question. The results show that in this case one could not say that the type of reasoning ability utilized by the Canadian children was less abstract than that used by Sierra Leone children. Vernon's (1969) implied cultural differentiation between the more expressive, abstract and conceptually advanced language of the civilized (that is the English language) and the restrictive (though no actual examples were given to substantiate this communication deficiency within any one African group!) as well as inadequate cognitive medium of the less advanced (non-European) languages is not supported by the present results. It would be hard to ascribe a specific type or quality of linguistic or cognitive ability to either the "British culture" or the "ethnic groups" in regard to language competance. Our data gave us certain descriptions of the ways children tackled verbal logical problems. We cannot ascribe causal definitiveness to this data at this time.

Emergence of Syllogistic Factors

The scores for each of the four IQ groups were subjected to a factor analysis. The factor loading for each type of syllogism was sought in order to present a picture of the manner in which the syllogisms were treated by each of the IQ groups. These loadings are presented in Tables 45 to 48.

It is obvious from Table 45 that the Sierra Leone high IQ group did not differentiate among the types of syllogisms presented.

In Table 46 also, the syllogisms were treated in an undifferentiated manner. Clearly then both groups from Sierra Leone understood all the syllogistic items as if they were similar in some way.

In Table 47 the Canadian high IQ group produced much stronger factors, but they, like the Sierra Leone groups, treated the syllogisms as similar.

However, the low IQ subjects in Canada present a somewhat different picture (Table 48). Two factors emerged, with loadings of irrelevant syllogisms on the first factor and relevant syllogisms on the second factor. It was observed that the patterns of factors (Tables 45 to 48) was similar for the two groups from Sierra Leone, but dissimilar for the two groups from Canada. The low IQ group from Canada had in fact performed very differently from the other three groups.

It should be emphasized that these factor analyses were however of an exploratory nature. The tests used here are new and need to be tested in further factor analytic studies in order to establish the reliability of their factors. At the present time this analysis would seem to

Table 45

Rotated Factors (Varimax) for Sierra Leone High IQ N=57

Syllogisms relevant to Sierra Leone	0.850
Syllogisms relevant to Canada	0.576
Culturally irrelevant syllogisms (Realistic)	0.564
Culturally irrelevant syllogisms (Unrealistic or artificial)	0.569

Table 46

Rotated Factors (Varimax) for Sierra Leone Low IQ N=48

Syllogisms relevant to Sierra Leone	0.770
Syllogisms relevant to Canada	0.502
Culturally irrelevant syllogisms (Realistic)	0.752
Culturally irrelevant syllogisms (Unrealistic or artificial)	0.636

Table 47

Rotated Factors (Varimax) For Canada High IQ N=60

Syllogisms relevant to Sierra Leone	0.719
Syllogisms relevant to Canada	0.795
Culturally irrelevant syllogisms (Realistic)	0.763
Culturally irrelevant syllogisms (Unrealistic or artificial)	0.698

Table 48

Rotated Factors (Varimax) For Canada Low IQ N=42

	Factor 1	Factor 2
Syllogisms relevant to Sierra Leone	0.038	0.608
Syllogisms relevant to Canada	0.024	0.821
Culturally irrelevant syllogisms (Realistic)	0.752	0.356
Culturally irrelevant syllogisms (Unrealistic or artificial)	0.865	0.183

indicate that seeing the items as syllogisms (that is, that the premises were related by a logical principle) was the only important strategy for success in this test.

Median-Split Analysis (Syllogisms)

As before, the subjects were divided into high and low on simultaneous and on successive processing. Table 49 presents mean scores and standard deviations for syllogisms for the groups resulting from median splits. In Table 50, the ANOVAS are summarized tests.

It will be observed for each type of syllogism as well as for the combined total that the high median in the successive and simultaneous groups outperformed the low median groups. In other words it appears that higher proficiency in either the successive or simultaneous mode proved advantageous in the solution of syllogisms regardless of their cultural or conceptual content. Indeed both kinds of processes are necessary for solving syllogisms. Not only should a subject be able to analyse sequential elements of a syllogism but should also be able to effect an integration of the parts as a total logical fact in arriving at a solution.

We wish to relate the results of simultaneous-successive grouping to those obtained previously. The results of the present study showed that the Sierra Leone

Table 49

Comparison between High and Low Successive and Simultaneous Groups on Syllogistic Reasoning.

		Means and SD's			
		Successive Group		Simultaneous Group	
		High N=104	Low N=103	High N=104	Low N=103
Total Syllogisms	M	9.67	7.22	9.28	7.62
	SD	2.01	2.28	2.20	2.45
Syllogisms relevant to	M	2.65	2.10	2.60	2.16
Sierra Leone	SD	0.57	0.89	0.62	0.89
Syllogisms relevant to	M	2.32	1.93	2.29	1.96
Canada	SD	0.71	0.92	0.73	0.92
Culturally irrelevant	M	2.43	1.77	2.23	1.97
(Realistic)	SD	0.71	0.79	0.78	0.85
Culturally irrelevant	M	2.29	1.44	2.23	1.50
(Artificial of unrealistic)	SD	0.82	0.95	0.88	0.94

Table 50

Summary of ANOVAS For High and Low Successive and Simultaneous Groups on Syllogisms.

Type of Syllogism	Type of Groups	DF	MS	F	P
Total Syllogisms	High vs. Low Successive Groups	1	309.42	70.66	below 0.001
Total Syllogisms	High vs. Low Simultaneous Groups	1	141.31	27.63	below 0.001
Relevant to Sierra Leone	High vs. Low Successive Groups	1	15.94	31.32	below 0.001
Relevant to Sierra Leone	High vs. Low Simultaneous Groups	1	9.98	18.52	below 0.001
Relevant to Canada	High vs. Low Successive Groups	1	7.61	11.75	below 0.001
Relevant to Canada	High vs. Low Simultaneous Groups	1	5.48	8.34	below 0.001
Culturally Irrelevant (Realistic)	High vs. Low Successive Groups	1	22.88	40.76	below 0.001
Culturally Irrelevant (Realistic)	High vs. Low Simultaneous Groups	1	3.47	5.3	0.02
Culturally Irrelevant (Unrealistic)	High vs. Low Successive Groups	1	37.53	47.83	below 0.001
Culturally Irrelevant (Unrealistic)	High vs. Low Simultaneous Groups	1	28.00	33.82	below 0.001

samples performed significantly better than the Canadian samples, and the high IQ group tackled syllogisms better than the low IQ group. The high IQ group were also better equipped with successive and simultaneous processing skills than were the low IQ group. However since the Canadian low IQ group appeared, from the ANOVAS and from the factor analysis, to be performing very differently from the rest, one is tempted to speculate that their difference reflects their difficulty in utilizing successive and simultaneous processing strategies.

In conclusion, reasoning ability as indicated by the median-split analysis is enhanced not only by a logical sequential cognitive process (successive) but also by a synthetic, holistic process (simultaneous). It is concluded that successive and simultaneous processes play an important role in syllogistic reasoning.

CHAPTER 12

Recapitulation, Conclusions and Implications

This thesis has focused on two major areas, namely memory and reasoning within a cross-cultural context. In the first part of the thesis, a critical study of certain methodological problems in previous cross-cultural studies were discussed. This critique was embarked upon because the author had concerns about certain recurrent conclusions in previous research and their characterizations of non-western groups.

The study of memory and reasoning constituted the empirical part of the thesis. Culture and IQ were treated as the independent variables in the study. These variables produced results which showed specific cultural differences as well as intellectual differences that cut across cultural settings.

The memory and reasoning tests (the dependent variables) were chosen because of their sensitivity in the respective cultures.

The tests used in this thesis fell into three major areas. The first group dealt with Modalities, the second dealt with Categorization and the third with Syllogistic reasoning. The last two were basically reasoning tests whereas the first test was basically a memory test.

The researcher in this case is a native of Sierra Leone and has lived in Canada for 9 years; his knowledge of the two cultures was relatively intimate. Since he spoke the lingua franca in both countries, it was easy to present the tests and exaplanations in the language of the subjects maintaining both structural and conceptual equivalence in his presentations. The following is a summary of the conclusions reached in the preceding chapters:

1. The Modalities tests produced no significant cultural differences when all modalities were combined as well as when only the two types of presentations were considered. When specific modalities and specific types of presentation were examined there were areas of significant differences and areas of no differences.

2. The Categorization test produced significant cultural differences. An examimation of the reasons for forming their groups revealed that the Canadian group used the qualitative aspects of the objects as a categorical principle more often than the Sierra Leoneans who tended to use the functional aspects of the objects as a categorical principle. It turned out that the scoring criteria favoured the Canadian modus operandi since the examiner-determined criteria for correct grouping was based on the qualitative aspects of the objects.
3. Syllogisms presented a very interesting case. The Sierra Leoneans performed significantly better than the Canadians in all the syllogisms except items that were culturally irrelevant and unrealistic. In this case neither culture performed significantly better than the other. An examination of the subjects' justifications for reaching a certain conclusion revealed that on the whole the two groups used a logical approach though the Sierra Leone group tended to use this approach more frequently than did the Canadians. Some children from both cultures used their personal experience or socio-cultural background as a verification of the logic in

syllogisms.

4. It was clear from further analysis that in most cases performance on the tests was enhanced by a special cognitive mode of processing information. Both the Modalities tests and the Syllogisms resulted in significantly better performance by those subjects who were proficient in either simultaneous or successive processing. The Categorization tests were indifferent to proficiency in either of these processing skills. The difference seemed to lie in the fact that the Modalities tests and syllogisms apparently involved the two levels of processing exemplified by successive and simultaneous processing. Categorization on the other hand appeared to involve an unidimensional cognitive approach.
5. In all of the tests the high IQ groups performed significantly better than the low IQ groups. In the case of the Categorization tests, however there were in general no significant differences between the IQ groups in respect of their preference for any class of object. Also there were no significant differences among the IQ groups with respect to their ability to identify any complete class of objects within this

> study. However, with respect to those groupings whose membership deviated from examiner-determined criteria the high IQ groups showed greater proficiency by producing many more relatively conventional groupings than did the low IQ groups. The picture as explained earlier, was different in the case of the relative performance of the two cultural groups. In all cases it was possible to make a direct comparison between the two cultures because the tests were developed to permit this.

In the context of the work reported in the present thesis, some broader issues concerning cross-cultural research are discussed in the succeeding paragraphy; one of them touches upon the influence of the background of researchers on cross-cultural studies.

The advantage of being culturally 'at home' in more than one culture is not available to many cross-cultural researchers. But this situations appears to be the ideal for cross-cultural psychology. For example the writer of this thesis found that his relative familiarity in both cultures studied, made it unnecessary to rely on reported information about the countries and subjects involved in the study. In both countries an understanding of non-verbal cues of communication helped to create a less threatening testing atmosphere than would have otherwise been possible. The subjects were consequently not reticent or unduly distracted. A researcher with less familiarity with the cultures may not have been aware of the need to respond in certain expected ways. Even when an indigenous collaborator is present it may not always be possible to consult with each other on these matters.

Of greater importance is the vestment of interest and motivation that a bi-cultural researcher would have in producing a benign and non-ethnocentric picture of the two (or more) cultures with which he has close ties. A number of uncomplementary statements discussed in the Review of Literature would probably not have occurred in these writings if the researcher had felt any kinship with the groups being studied.

The discusions relating to the type of strategies used in categorizing objects and the results of the Syllogisms for Sierra Leone and Canada respectively are examples of the way in which intimate knowledge about people does influence the kinds of conclusions or interpretation a researcher is willing to make. This writer is not willing in view of his knowledge about the subjects to see any superiority in the categorical strategy used by the Canadians and therefore used the data to "prove" this. A writer committed to the view that the Canadians were of superior ability would have argued differently. In the case of the statistically superior performance of the Sierra Leoneans in Syllogisms, this writer is unwilling to characterize the Canadians as having less ability for abstract reasoning, because he is not committed to that viewpoint.

In order to reduce ethnocentric bias one may suggest continual exchanges in the form of visits and information update as well as genuine academic or social relationships which will help bring non-indigenous researchers closer to the culture of their interest. In this way it is hoped that ethnocentrism will gradually disappear in cross-cultural literature. In fact it should be pointed out that ethnocentic statements are much fewer in comtemporary publications than before.

Another issue of importance which invites comments is the variable of intelligence in this study. Raven's Progress Matrices Test (1963) was used to assign subjects to the four IQ groups in this study (Appendix I). The use of this test was not however meant to indicate that the present author accepted this test as a test of general intelligence. Indeed it has been shown that in a cross-cultural context the Progressive Matrices reflected the effect of schooling or literacy (Dague, 1972). But as a test of reasoning among children who have had the same years of schooling it would appear to present less of a psychometric problem. Berry (1976) used this test to denote inferential ability in an extensive cross-cultural research project. Since Hunt (1974) and Carroll and Maxwell (1979) have cast doubt on the Raven's Progressive Matrices as a measure of general intelligence among American children, it would seem reasonable to reject an argument that this test could in this study be presupposing any general theory of intelligence. At best this test offers a convenient method for grouping subjects along some criterion of reasoning ability which seems useful for problem-solving. As indicated in Appendix I this test served the purpose of differentiating high vs. low intellectual groups (or more accurately high vs. low problem-solvers) in each culture without giving advantage to any cultural group. In effect the Progressive Matrics has been used as a sampling devise which, according to Goodenough (1936), is the best way to utilize a test such as the Progressive Matrices in a cross-cultural context.

The main question that arises when a non-indigenour test is being used, is whether the abilities required to perform the task is culturally salient. In this case the fact that the children from both countries were school-going reduced, especially for Sierra Leone, the degree of irrelevance that such a test might have otherwise. That is, it is salient in the sense that the cognitive demands of schooling which this test reflects are valued in Sierra Leone, as part of its educational sub-culture. This use of a non-indigenous test is very different from the way Vernon (1969) for example, suggested it should be used - that is, as a non-western measure of a western ability, whether the latter is culturally salient or not.

Returning to the empirical part of the thesis, some implications of the results are to be considered next. The implications we wish to highlight are educational and cultural.

It was clear from the results of the study that the pattern of modality preference or efficiency is not very different between children in Sierra Leone and Canada. In both countries the visual modality feature highest in the analysis of hierarchical is performance. These results appear to suggest that the visual modality is the most efficient medium for teaching students of the kind represented in this study.

It seems however that whereas visual presentation has been long utilized in the educational settings of school children in the western world, the developing countries such as Sierra Leone are still exploring as to which modality is the best medium. If this study is any guide, the visual modality would seem to be the most reliable medium, specifically for material requiring short term recall.

In the discussion on the Categorization test it was noted that the categorical principle used by the Sierra Leoneans differed from that anticipated by the structure of the test. That is, it was argued that the cultural modus operandi used by the Sierra Leoneans meant that the task they perceived (a functionally based problem) was very different from the task perceived by the Canadians (a qualitative problem). If the results of this test do in fact identify a definitive approach on the part of the samples, especially the Sierra Leone groups, it would appear that there are probably culturally prevalent ways of perceiving problems. It would be productive therefore to harness such culturally appropriate learning potential in local testing situations in Sierra Leone schools instead of utilizing a less salient ability as a yardstick for learning potential.

In view of the complexities underlying cultural differences, and at the same time, similarities in cognitive functioning as depicted by the results of this thesis, some problems for future research can be suggested. Two urgent priorities seem to emerge. There is a need for replication of this research utilizing different groups within each culture as well as other cultural groups, and a need to examine the developmental characteristics of memory and reasoning in different cultures. A large amount of work has been done in the two areas of memory and reasoning within specific theoretical paradigms such as Piagetian developmental theory or field dependence and independence. Simultaneous and successive modes of processing should be now examined in relation to development of reasoning and memory.

Another important area is the potential that a median-split analysis has for cross-cultural research in memory and reasoning.

The median-split technique has been used with simultaneous-successive processing tasks in this study. It is now being suggested that culturally appropriate tests such as syllogisms and categorization tests (as used in this study) could be utilized to differentiate cross-cultural groups on the basis of the abilities that are consistent with the performance of culturally appropriate tests.

In conclusion, the present study casts doubt on a unitary theory of culture in respect of memory and reasoning. That is, the data discussed in the thesis show that conclusions in a cross-cultural context are likely to be misleading, or at least inconclusive, when they are drawn from a global picture. As observed, an analysis of subtests usually produced specific conclusions. There was no basis for generally characterizing any of the two cultural groups in terms of cognitive proficiency or lack of proficiency in memory and reasoning abilities.

This thesis has however presented only a limited view of the cultural diversity in memory and reasoning abilities. It does not pretend to have escaped all methodological and logical inaccuracies, some of which were examined in Part Two. However, the writer has attempted to contribute to cross-cultural psychology by presenting a quasi-experimental study which is preceded by a reflective discussion on viewing a different culture.

It is hoped that the shortcomings of this thesis will be less obvious than its contributions.

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APPENDIX I

Discussion on the Use of Progressive Matrices

The Raven's Progressive Matrices (Raven, 1963) was the most culture reduced test available to the author which could apply cross-culturally. Concern about the appropriateness of Raven's Coloured Progressive Matrics for the subjects from Sierra Leone led to administering the test to about one thousand children in that country. The high and low IQ groups were chosen by a random selection from this sample. The same procedure was followed in Canada, except that the number tested was about two hundred. In both countries the expectation was to keep the high and low IQ groups at 60 subjects. However attrition in the samples resulted in uneven numbers in the four IQ groups, because some of the subjects did not do all the tests. The means and SD's for each group's performance on the Progressive Matrices is given in the table below. The final number in each group as given in Figure I are also given in the table below.

Means and SD for Progressive Matrices

		High IQ Group Raven's 75-100 Percentile	Low IQ Group Raven's 25-0 Percentile
Sierra Leone:	Mean =	28.20	14.96
	SD =	3.66	3.97
	N =	48	57
Canada:	Mean =	32.68	18.81
	SD =	3.09	3.98
	N =	60	42

When the Ravens Progressive Matrices scores were subjected to a 2 (IQ groups) X 2 (Culture groups) ANOVA, main effects were found for culture and IQ. The Canadian mean score was significantly higher than the Sierra Leonean mean score, with no interaction effects. Based on these results it could be argued that the use of the Progressive Matrices to form the experimental groups provided an undue advantage for the Canadian sample. If the superior performance on this test by the Canadian samples in fact indicated an over-all advantage, they should be expected to consistently show better performance than the Sierra Leonean groups in all of the cognitive tests which were given in this study.

This was not the case. For example, in the total scores for Modalities test and in the total scores for types of presentation there were no significant differences due to cultural setting. But in the modality subtests (Table 8) and when methods of presentation were combined, there were no significant differences in some results and in others the Canadians as a group showed superior performance. On the Syllogisms however, the Sierra Leoneans generally performed significantly better than the Canadians. Again in a number of instances in which the interaction between IQ and culture was significant, a significantly lower performance of the low IQ sample from Canada was observed. So then it would seem that the superior performance of the Canadian samples over the Sierra Leonean sample on the Progressive

Matrices did not 'set the stage' for the Canadians to show better performance than the Sierra Leoneans in this study.

In the case of the IQ groups the significantly better mean scores of the high IQ groups from both countries observed in the Progressive Matrices was consistently evident in the significantly better performance of this group over the low IQ group in all the other tests. This result seemed to reinforce the appropriateness of the Progressive Matrices as a sensitive measure of intellectual ability among the school children in the study.

The table below summarizes tha main effects for culture among the groups in the major areas of the test. It is intended to support the above argument that the Canadian sample did not consistently do better than the Sierra Leone sample. It should be noted that even when the Canadian sample outperformed the Sierra Leoneans the significantly lower performance of the Canadian low IQ resulted in an interaction in a number of instances.

Tests	Differences between Cultural Groups	Probability
Modalities Test (total score)	None	0.92
Successive Presentations	None	0.26
Simultaneous Presentations	None	0.48
Successive and Simultaneous presentations		

Tests	Differences between Cultural Groups	Probability
combined for:		
- Visual	None	0.06
- Tactile	None	0.19
- Auditory	Canada > Sierra Leone	0.03
- Cross-modal	Canada > Sierra Leone	0.01
Categorization Test	Canada > Sierra Leone	below 0.001
Total Syllogisms	Sierra Leone > Canada	below 0.001
Syllogisms		
- Relevant to Sierra Leone	Sierra Leone > Canada	below 0.001
- Relevant to Canada	Sierra Leone > Canada	below 0.001
- Culturally irrelevant (realistic)	Sierra Leone > Canada	0.03
- Culturally irrelevant (unrealistic)	None	0.30

APPENDIX II

Syllogisms (in order of presentation)

Instructions: "First, I will tell you something and then I will ask you a question about what I just told you. Let's do some examples: Listen to this:"

NAME:__________ AGE:____ SCHOOL:________________ GRADE:_____

ITEMS	TYPE OF SYLLOGISM	ANSWER	WHY, DID YOU SAY SO?
Trial Items:			
A. Good boys are nice. (Subject's name) is a good boy. Is (Subject's name) nice or not?	Example		
B. In countries where there is snow, people ski a lot. There is snow in Canada. Do people in Canada ski a lot?	Example		
C. Important people in society look alike. Kemoh Sanday and Siaka Stevens are important persons in Sierra Leone. Do they look alike or not?	Example		

ITEMS	TYPE OF SYLLOGIMS	ANSWER	WHY, DID YOU SAY SO?
Test Items:			
1. Sugar cane grows in hot countries. Sierra Leone is a hot country. Does sugar cane grow there?	Relevant to Sierra Leone		
2. Islands are surrounded by water. Iceland is surrounded by water. Is Iceland an Island?	Culturally irrelevant (Realistic)		
3. All rich people in Sierra Leone are called "gentry". Pa Sandy is not a rich man in Sierra Leone. Is he a gentry or not?	Relevant to Sierra Leone		
4. Whereever there is an X, there is a Y. Suppose I showed you an X. Would you expect to find a Y or not?	Culturally irrelevant (unrealistic or artificial)		
5. All dogs can fly and all elephants are dogs. Can all elephants fly or not?	Culturally irrelevant (unrealistic or artificial)		

ITEMS	TYPE OF SYLLOGISM	ANSWER	WHY, DID YOU SAY SO?
6. When it gets very hot streams dry up. Red Water is the name of a stream in Freetown. Does it dry up when the weather gets very hot or not?	Relevant to Sierra Leone		
7. Important people in Society look alike. Pierre Trudeau and Bobby Hull do not look alike. Are they important or not?	Relevant to Canada		
8. All old people in Canada are called Senior Citizens. Chief Dan George is an old man in Canada. Is he a Senior Citizen or not?	Relevant to Canada		
9. A is taller than B. B is taller than C. Who is taller, A or C?	Culturally irrelevant (artificial or unrealistic)		

ITEMS	TYPE OF SYLLOGISM	ANSWER	WHY, DID YOU SAY SO?
10. Water surrounds all islands. Italy is not an island. Is Italy surrounded by water?	Culturally irrelevant (realistic)		
11. When the weather gets very cold, all rivers turn to ice. The North Saskatchewan is the name of a river in Edmonton. Does it turn ice in very cold weather or not?	Relevant to Canada		
12. All field sports are dangerous. Swimming is not a field sport. Is swimming dangerous or not?	Culturally irrelevant (realistic)		

APPENDIX III

MODALITY TESTS

NAME..............................
AGE...............................
PLACE OF TESTING..................
TESTED BY.........................
DATE OF TESTING...................

REMARKS

I. Facility of Response
e.g. Q = Quick
B = In-Between
D = Delayed

II. "Mediation": Part of body used

III. Relaxed (R) or Tense (T)

PRACTICE TRIALS

Test Pattern	Match Pattern	SUBJECT'S CHOICE		SCORE	REMARKS
		Same	Different		
B A VISUAL (SUCC)	B VISUAL (SUCC)				
A B VISUAL (SIM)	B VISUAL (SIM)				
C C VISUAL (SUCC	C VISUAL (SUCC				
A D TACTILE (SUCC)	C TACTILE (SUCC				
A E TACTILE (SUCC)	A TACTILE (SUCC				
B F TACTILE (SIM)	C TACTILE (SIM)				
A G AUDITORY	B AUDITORY				

Pattern A = 0 00
Pattern B = 0 0 0
Pattern C = 00 0

NAME......................
AGE.......................
PLACE OF
TESTING...................
TESTED BY.................
DATE OF
TESTING...................

REMARKS

I. Facility of response
e.g. Q = Quick
B = In-Between
D = Delayed

II. 'Mediation': Part of body used

III. Relaxed (R), Tensed (T), Covert (C)

Test Pattern	Match Pattern	Response		Score	Remarks
		Same	Diff/nt		
A 1 VIS (sim)	B VIS (sim)				
A 2 TAC (sim)	A TAC (sim)				
C 3 AUD	B AUD				
B 4 VIS (sim)	B TAC (sim)				
C 5 VIS (succ)	C VIS (succ)				
A 6 TAC (succ)	C TAC (succ)				
B 7 VIS (sim)	B VIS (sim)				
C 8 VIS (succ)	A VIS (succ)				

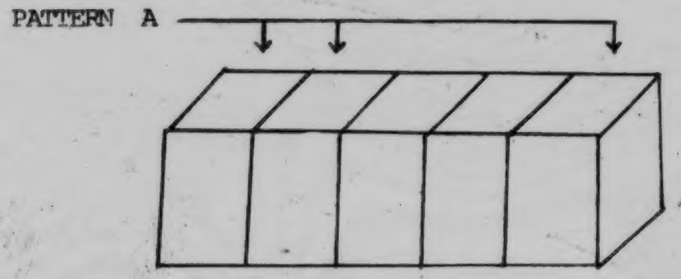
Test Pattern	Match Pattern	Response		Score	Remarks
		Same	Diff/nt		
B 9 TAC (sim)	B TAC (sim)				
A 10 AUD	C AUD				
A 11 VIS (sim)	A VIS (sim)				
B 12 TAC (succ)	C TAC (succ)				
A 13 VIS (sim)	B VIS (sim)				
B 14 TAC (succ)	A TAC (succ)				
C 15 VIS (succ)	C VIS (succ)				
B 16 VIS (sim)	C TAC (sim)				
A 17 TAC (sim)	A TAC (sim)				
C 18 AUD	A AUD				
B 19 TAC (succ)	B TAC (succ)				
A 20 VIS (sim)	A TAC (sim)				
B 21 AUD	B AUD				
A 22 TAC (sim)	C TAC (sim)				
C 23 TAC (succ)	C TAC (succ)				

Test Pattern	Match Pattern	Response		Score	Remarks
		Same	Diff/nt		
B 24 VIS (sim)	B VIS (sim)				
C 25 VIS (sim)	C TAC (sim)				
A 26 VIS (succ)	A VIS (succ)				
C 27 TAC (sim)	B TAC (sim)				
A 28 TAC (succ)	A TAC (succ)				
C 29 VIS (sim)	A TAC (sim)				
C 30 AUD	C AUD				
B 31 TAC (sim)	C TAC (sim)				
B 32 VIS (sim)	A TAC (sim)				
A 33 VIS (sim)	C VIS (sim)				
B 34 VIS (succ)	C VIS (succ)				
A 35 AUD	A AUD				
C 36 VIS (succ)	B VIS (succ)				

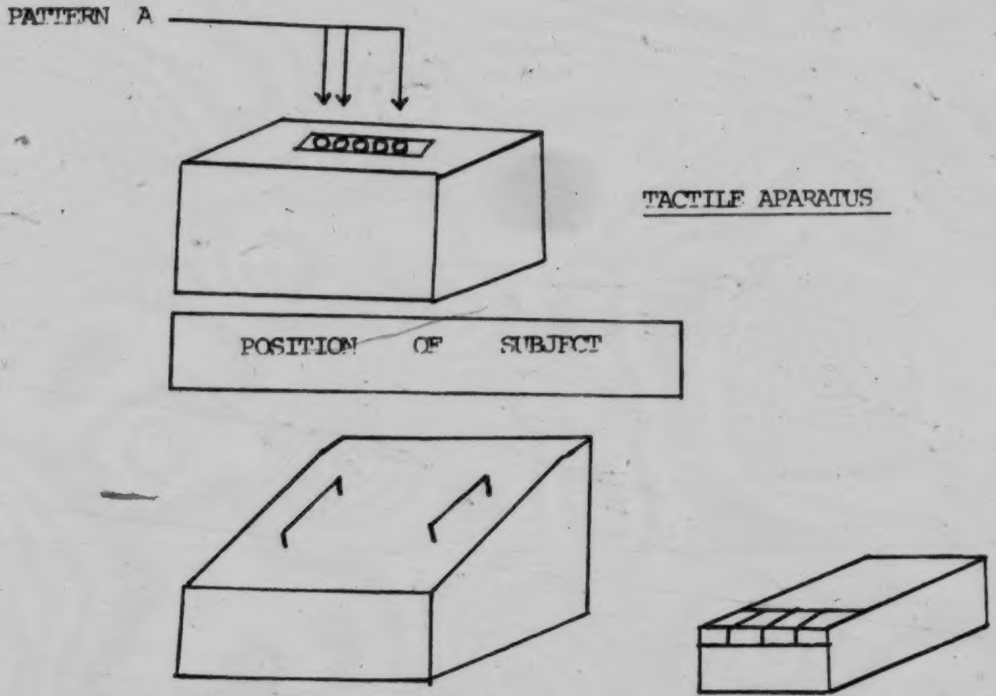
Successive Presentations	Score	Simultaneous Presentations	Score
Visual-Visual		Visual-Visual	
Auditory-Auditory			
Tactile-Tactile		Tactile-Tactile	
		Visual-Tactile	

TOTAL ____________ TOTAL ____________

TOTAL MODALITY PERFORMANCE SCORE____________



VISUAL APARATUS



CONTROL BOX : TAPE RECORDER

APARATUSES USED IN MODALITY TESTS